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MARSHALL GUIDANCE MANUAL

ED01

MSFC CONFIGURATION MANAGEMENT GUIDANCE

with Change 2 (10/18/17)

DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Change/ Canceled)	Document Revision/ Change	Effective Date	Description
Baseline		8/14/2013	This document replaces the content of MPR 8040.1.
Change	1	2/10/2014	On 2/10/14, at the request of the OPRD, Administrative Changes were made to Appendix K, References to correct document titles and numbers. Corresponding corrections to document titles and numbers were made in Sections 1 and E.6.
Change	2	10/18/2017	On 10/18/17, at the request of the OPRD, Administrative Changes were made: throughout document, updated pointers to MPR 7123.1, changed S&MA to SMA, changed "category" or "categorization" to "mission type" when referencing MPR 7120.1 mission types, and corrected typographical errors; where applicable, changed references to NPR 1441.1 to NRRS 1441.1; updated Table 1 to be consistent with NRRS 1441.1; provided clarifications to the following paragraphs: 3.b, 3.c, F.5.4, G.5.2.1, H1.5.5.1, H2.5.2, H3.5.2, and I.5; reorganized paragraph H1.5.5.

TABLE OF CONTENTS

Page

TABLES

FIGURES

1. PURPOSE

The purpose of this Marshall Guidance Manual (MGM) is to provide guidance for Marshall Space Flight Center (MSFC) programs, projects, and activities to plan, develop, implement, and maintain Configuration Management (CM) systems as required by MPR 7123.1, MSFC Systems Engineering Processes and Requirements.

2. APPLICABILITY

a. This MGM applies to Center personnel, programs, projects, and activities, including contractors and resident agencies to the extent specified in their respective contracts or agreements. ("Contractors," for purposes of this paragraph, include contractors, grantees, Cooperative Agreement recipients, Space Act Agreement partners, or other agreement parties.)

b. This MGM applies to the Michoud Assembly Facility.

c. This MGM applies the following: all mandatory actions (i.e., requirements) are denoted by statements containing the term "shall." The following terms also apply: "may" or "can" denote discretionary privilege or permission; "should" denotes a good practice and is recommended, but not required; "will" denotes expected outcome; and "are/is" denotes descriptive material.

d. This MGM applies the following: all document citations are assumed to be the latest version unless otherwise noted.

e. This MGM applies to all MSFC programs/projects beginning during the formulation phase and continuing throughout their program/project life-cycle. The CM guidance contained in this MGM applies to flight, qualification, and protoflight hardware/software, designated development hardware/software, configuration item (CI)-associated support equipment, and CI-unique facilities.

3. GUIDANCE

A CM program is implemented during the formulation phase which addresses the requirements for CM planning, configuration identification, configuration control, configuration accounting, and configuration verification as identified in MPR 7123.1. The CM process controls product documentation, including technical requirements, system and end-product specifications, and interface control documents/drawings, to assure the integrity of the product design and build.

This MGM provides guidance for implementing the CM requirements identified in MPR 7123.1. Program/Project Managers, working with their CM personnel, may tailor implementation to meet the specific needs of the project consistent with project size, complexity, criticality and risk. MSFC project mission types and risk classifications are defined in MPR 7120.1.

Detailed guidance for CM functions is contained in the following appendices:

a. Appendix E, Roles and Responsibilities, defines the typical roles and responsibilities of personnel involved in the CM process.

b. Appendix F, Guidance for Configuration Management Planning, provides guidance for developing a CM strategy and directions for developing and maintaining a configuration management plan throughout the lifecycle of a program/project.

c. Appendix G, Guidance for Configuration Identification, establishes the process to select and identify configuration items.

d. Appendix H1, Guidance for Configuration Control, provides guidance for the control of hardware and software configurations for which MSFC has responsibility.

e. Appendix H2, Guidance for Configuration Control Boards (CCBs), provides guidance for establishing CCBs, lists the configuration control boards typically involved in the CM process and provides a brief description of the role and authority of each.

f. Appendix H3, Guidance for Deviation/Waivers, provides guidance for generating, processing, and implementing deviations and waivers to specified requirements for MSFC program/project CIs or CSCIs.

g. Appendix H4, Guidance for Product Configuration Control at Remote Locations, provides guidance to processing Field Engineering Changes (FEC), Mod Kits, and Software Updates.

h. Appendix I, Guidance for Configuration Accounting, provides guidance for the implementation of configuration release accounting and configuration status accounting.

i. Appendix J1, Guidance for Configuration Verification and Audits, provides guidance for insuring that CIs are properly identified, approved, released, and controlled throughout the program/project life cycle, and that the proper data has been maintained and reports generated to verify the configuration.

j. Appendix J2, Guidance for FCA/PCA, provides detailed guidelines to conduct an FCA and/or PCA.

k. Appendix J3, Guidance for CM System Audits, provides detailed guidance for conducting CM Systems Audits, including an audit plan outline, audit check list, and an example CM audit report.

4. CANCELLATION

None

Original signed by

Patrick E. Scheuermann
Director

APPENDIX A
DEFINITIONS

Allocated Baseline. The approved and released configuration documentation describing a CI's performance, interoperability, and interface requirements that are allocated from a system or higher level CI and the verifications required to demonstrate the achievement of these specified requirements.

As-Built Configuration. The actual hardware condition as a result of inspections performed and documented on the parts tags during the manufacturing and assembly process. For in-house projects, the as-built configuration is provided as an end-item summary under QD-QA-027.

As-Designed Configuration. The original released design drawings, parts lists, and changes thereto used to initiate the manufacture and assembly process. It is usually summarized by the end item or CI.

Auditor(s). A team or individual authorized to conduct a specific audit.

Board Change Evaluation (BCE): A change evaluation submitted by a control board to a higher level control board in response to the review of a proposed change which is being evaluated by the higher level board. The BCE includes the lower level board's recommended change disposition, specific changes to the proposal, rationale, or impacts to support the recommendation.

Change Package. The consolidated record, assigned a unique number, of all pertinent information associated with requesting, processing, and implementing a baseline, change or deviation/waiver. The typical change package includes the change request or deviation/waiver, supporting documentation, change evaluations (CEs), change board directives with authorized implementation actions, and action closure data.

Change Package Engineer (CPE). A person with expertise in the technical areas affected by a change who is assigned to consolidate pertinent data and CEs and recommends a change disposition to the appropriate control board.

Change Evaluation (CE): An assessment made by an evaluator during a formal CCB review to identify and document areas affected by the implementation or disapproval of a proposed change. The CE includes a recommended change disposition, specific changes to the proposal, rationale, or impacts to support the recommendation.

Change Request (CR). The format used to document a proposed engineering change. It is used to submit documentation for the initial baseline or to process changes to the baseline for evaluation and disposition by the appropriate Configuration Control Board (CCB).

Commercial and Government Entity (CAGE) Code. A five-character, alpha-numeric code, which is assigned to commercial and Government activities that manufacture or develop items or

provides services or supplies for the Government. When used with a drawing number or part number, the CAGE code designates the design activity to which the drawing or part number is assigned.

Computer Software Configuration Item (CSCI). An aggregation of software that satisfies an end-use function and is designated for separate CM by the acquirer. Selections are based on tradeoffs among software function, size, host or target computers, developer, support concept, plans for reuse, criticality, and interface considerations.

Configuration. The functional and physical characteristics of a product (i.e., hardware, software, or a combination thereof) as defined in technical documentation and achieved in a product.

Configuration Accounting. Formalized recording and reporting of the established configuration documents, the status of proposed changes, and the status of the implementation of approved changes.

Configuration Baselines. All released configuration documentation that represents the definition of the CI at a specific point in time. The baseline serves as the basis for defining changes to the CI. Specific configuration baselines consist of the Functional, Allocated, and Product Baselines.

Configuration Control. The systematic definition, evaluation, coordination, and disposition of each proposed change, deviation, or waiver to the CI baseline and the implementation of each approved change in the configuration of the CI.

Configuration Control Board (CCB). The functional body responsible for establishing baselines and reviewing and dispositioning all changes, deviations, and waivers to these baselines.

Configuration Control Board (CCB) Chairperson. The appointed individual who directs the configuration control process and dispositions all changes or deviations/waivers that are proposed and processed through the CCB.

Configuration Control Board (CCB) Members. The individuals appointed to a CCB to review changes and deviation/waivers processed through the CCB and advise the CCB Chairperson on the impacts to their area and the disposition of the changes.

Configuration Control Board (CCB) Secretariat. The appointed individual who implements the configuration control process associated with the CCB.

Configuration Documentation. The program/project-specific technical documentation (i.e., drawings, parts lists, specifications, standards, interface control documents/drawings [ICDs], software version descriptions [SVDs], and documents invoked therein) that identify and define the item's functional and physical characteristics.

Configuration Identification. Includes the selection of CIs; the determination of the types of configuration documentation required for each CI; and the issuance of numbers and other identifiers affixed to the CIs and to the released technical documentation that defines the CI configuration.

Configuration Item (CI). An aggregate of hardware, software, or any of its discrete portions, which satisfies an end-use function and is designated for CM. CIs may vary widely in complexity, size, and type.

Configuration Item (CI)-Associated Support Equipment. Any mechanical, electrical, or electro-mechanical equipment, (e.g., handling fixture or test set), which is a part of a program/project CI which interfaces with the CI and which is designated for CM.

Configuration Item (CI)-Unique Facility. Any fixed installation, (e.g., test stand or launch mechanism), which is part of a program/project CI and interfaces with the CI. This includes real property and installed equipment, but does not include the normal "brick and mortar," utilities, fluid/gas delivery systems, or other delivery systems that do not affect the end-use function of the CI or that are not controlled by applicable CI programs/projects.

Configuration Management (CM). A discipline applying technical and administrative direction and surveillance over the life cycle of a CI to implement CM planning, configuration identification, configuration control, configuration status accounting, and configuration verification and audits.

Configuration Management (CM) Audits. Audits that are performed by CM personnel on designated organization(s) having CM systems responsibility for CIs, to determine if the subject organizations have the mechanisms in place capable of executing the CM functions (control or accounting, etc.) in a closed-loop manner.

Configuration Verification and Audits. A closed-loop process by which all actions associated with the approval of CI documentation are tracked through closure, and the technical reviews and audits necessary to verify that the configuration of systems and CIs are in compliance with configuration identification documentation.

Control Board Directive (CBD). MSFC Form 2312, or equivalent format, which documents the CCB disposition and implementation actions for changes and deviation/waivers.

Critical Nonconformance. A nonconformance or design variation that affects safety, health, or a requirement defined as critical.

Design Activity. A Government, commercial, or nonprofit organization responsible for the design of a product.

Deviation. A specific written authorization, granted prior to the manufacture of a CI, to depart from a particular requirement of a CI's current approved configuration for a specific number of units or a specified period of time.

Deviation/Waiver Approval Request (DAR). MSFC Form 847, or equivalent format, which is used to request the approval of a deviation or waiver.

Effectivity. Effectivity defines the usage of a specific as-designed configuration for an event or range of events (flight(s), mission(s), test(s), etc.). The effectivity is designated by alpha-numeric identifiers that represent the CI and units of the CI. It is NOT equivalent to as-built serial numbers, lot numbers, or calendar dates. Effectivity for subordinate components of an assembly is equal to or greater than, each applicable assembly effectivity where the component is used.

Engineering Change Proposal (ECP). A document that describes a contractor-proposed change, identifies impacts, and provides justification for the proposal. MSFC utilizes MSFC Form 2348, or equivalent format, to document ECPs. The contractor submits the ECP to the Government for disposition. The program/project CCB is typically used to review and disposition the ECP, and the Contracting Officer (CO) sends the CCB's decision and direction to the contractor.

Engineering Change Request (ECR). A proposed engineering change used by MSFC personnel to submit documentation for the initial baseline or to process changes to the baseline for evaluation and disposition by the appropriate CCB. MSFC utilizes MSFC Form 2327, or equivalent format, to document ECRs.

Equivalent Format [for forms]. A format that collects and conveys the mandatory data fields equivalent to those required by a standard form. If utilized, a program/project should establish a process for creating, controlling, and tracking equivalent forms and document this process in the program/project Data Management Plan.

Field Engineering Change (FEC). The method used to propose engineering changes at NASA using sites on equipment for which MSFC retains design responsibility and when time is not adequate to prepare and process an engineering change.

Finding. A discrepancy that violates CM requirements which is documented during a CM audit and maintained as a record.

Functional Baseline. The approved and released configuration documentation describing a system or CI's functional, performance, interoperability, and interface requirements and the verification required to demonstrate the achievement of those specified functional requirements.

Functional Configuration Audit (FCA). The formal examination of functional characteristics of a CI, prior to acceptance, to verify that the item has achieved the performance specified in the functional and allocated baseline identification documentation.

Installation Notice Card (INC). A form used after CI delivery to update the CM system and to certify that a particular modification package or FEC has been installed, tested, verified, and accepted in accordance with its associated change modification instructions. MSFC utilizes MSFC Form 2490, or equivalent format, to document installation of field modifications.

Interface. Physical or functional interaction at the boundary between CIs.

Interface Revision Notice (IRN). The format used to record approved changes to baselined interface documents, MSFC Form 4229, or equivalent format.

Modification (Mod) Kit. A package containing necessary released documentation, hardware, software, modification instructions, and verification requirements to incorporate an approved engineering change into delivered CIs.

MSFC Release Desk. The MSFC functional entity (or entities) authorized as the official release point(s) for MSFC design activity configuration documentation or documentation not under configuration control that meets release requirements of MPR 7123.1. The MSFC Release Desk ensures that released data and changes have been appropriately authorized, the released version of design data and the data relationship to configuration items are captured, and release records are provided to the MSFC Repository as records custodians.

Observation. A discrepancy that does not violate CM requirements or a proposed process improvement which is documented during a CM audit, and maintained as a record.

Physical Configuration Audit (PCA). The formal examination of the as-built CI against its as-designed documentation.

Preliminary Interface Revision Notice (PIRN). The format, MSFC Form 4229 or equivalent format, used to describe proposed changes to baselined interface documents. After CCB approval, the PIRN becomes an IRN.

Product Baseline. The approved and released documentation describing the necessary functional and physical characteristics of the CI and the selected functional and physical characteristics designated for production acceptance testing and tests necessary for support of the CI.

Program Control Number (PCN). A unique number assigned to a change package used to relate subsequent documentation related to processing and implementing that engineering

change. The PCN associates related documentation or changes and facilitates consolidation into a complete change package record.

Receipt Desk. In the context of CM, a group or person, within a program/project that serves as the centralized receipt location for submittal of change package data (e.g., change requests, control board directives, directive action closures) and associated documentation and who performs the first quality check that the change data and documentation meets program/project requirements.

Release. Authorization to disseminate for use or implementation approved information and/or products subject to CM.

Release Desk. A generic term for the function that ensures documentation meets applicable release requirements prior to release, ensures the release is recorded, and ensures release records are maintained.

Screening. The review of a proposed change to determine mandatory evaluators and CCB schedules. The screening may be performed by one person or a screening group.

Secretariat. See CCB Secretariat.

Software. A combination of associated computer instructions and computer data definitions required to enable the computer hardware to perform computational or control functions.

Software Update. A change package containing necessary released documentation, software and instructions to install an approved engineering change into a delivered CSCI. A software update may be a patch or a complete revision to a CSCI.

Software Version Description (SVD). A document that accompanies and identifies a given version of a software system or component. Typical contents include an inventory of system or component parts, identification of changes incorporated into this version, instructions for compiling the software build, and installation and operating information unique to the version described.

Specification. A document which clearly and accurately describes essential technical and interface requirements for products and the criteria for determining whether those requirements are met.

System. A composite of equipment, skills, and techniques capable of performing and/or supporting an operational role. A complete system includes all equipment, related facilities, material, software, services, and personnel required for its operation and support to the degree that it can be considered a self-sufficient item in its intended operational environment.

Technical Authority (TA). The individual, or organization representatives delegated responsibility by that individual, who specifically maintains technical responsibility over establishment of, changes to, and waivers of requirements in a designated area.

Version. An initial release or re-release of a CSCI, associated with a complete compilation or recompilation of the CSCI.

Waiver. A written authorization, granted after manufacture, to accept a CI that is found to depart from specified requirement(s) of the CI's current approved configuration for a specific number of units or a specified period of time.

APPENDIX B
ACRONYMS

ABCSS	As-Built Configuration Status System
AFS	Agency Filing Scheme
ASME	American Society of Mechanical Engineers
BCE	Board Change Evaluation
CAGE	Commercial and Government Entity
CBD	Control Board Directive
CCB	Configuration Control Board
CDR	Critical Design Review
CE	Change Evaluation
CI	Configuration Item
CM	Configuration Management
CMP	Configuration Management Plan
CO	Contracting Officer
CPE	Change Package Engineer
CR	Change Request
CSCI	Computer Software Configuration Item
DAR	Deviation/Waiver Approval Request
DRD	Data Requirements Description
ECP	Engineering Change Proposal
ECR	Engineering Change Request
EIA	Electronic Industries Alliance
EO	Engineering Orders
FCA	Functional Configuration Audit
FEC	Field Engineering Change
ICD	Interface Control Documents/Drawings
IEEE	Institute of Electrical and Electronics Engineers
INC	Installation Notice Card
IRN	Interface Revision Notice
LSE	Lead Systems Engineer
MGM	Marshall Guidance Manual
MPR	Marshall Procedural Requirement
MRB	Material Review Board
MSFC	Marshall Space Flight Center
PCA	Physical Configuration Audit
PCN	Program Control Number
PIRN	Preliminary Interface Revision Notice
RID	Review Item Discrepancy
SMA	Safety and Mission Assurance
SAR	Systems Acceptance Review
SCM	Software Configuration Management
SCMP	Software Configuration Management Plan
SDO	Software Developing Organizations

STD Standard
SVD Software Version Descriptions
TA Technical Authority

APPENDIX C
VERIFICATION MATRIX

None

APPENDIX D
RECORDS

D.1 The records associated with this MGM are listed in Table I. Table I provides the records description, the NRRS 1441.1 Agency Filing Scheme (AFS) number, NRRS 1441.1 Schedule/Item number, NRRS 1441.1 record disposition, and the suggested Records Custodian assignment.

D.2 Records, their retention schedules, and disposition responsibility are identified in the Program/Project CMP in accordance with NPR 1441.1, and MPR 1440.2.

TABLE I: CM RECORDS

Record Description	Projects Meeting Criteria in Note 1 (below): AFS Number, Schedule/ Item, Record Disposition	Projects Not Meeting Criteria in Note 1 (below): AFS Number, Schedule/ Item, Record Disposition	Record Custodian (typical)
CM System Audit Plan (or planning materials), Audit Report, Findings/ Observations and Closures	1280. 1/26.5A. Temporary. Destroy when 7 years old.	1280. 1/26.5A. Temporary. Destroy when 7 years old.	Project CM Personnel or designee
FCA/PCA Plan, Issues/Action Items and Closures, Certificate of Completion	8000. 8/101. Permanent. Cut off records at close of program/project or in 3-year blocks for long term programs/projects. Transfer to records center storage. Transfer to National Archives 7 years after cutoff.	8000. 8/107. Temporary. Destroy/delete between 0 and 30 years after program/project termination. (see Note 2 below)	Project CM Personnel or designee
Configuration Documentation released by the MSFC Release Desk (specifications, drawings, other project data)	8000. 8/101. Permanent. Cut off records at close of program/project or in 3-year blocks for long term programs/projects. Transfer to records center storage. Transfer to National Archives 7 years after cutoff.	8000. 8/107. Temporary. Destroy/delete between 0 and 30 years after program/project termination. (see Note 2 below)	MSFC Repository (as required by MPR 2800.2)
Other Project Documentation authorized through a CCB	8000. 8/101. Permanent. Cut off records at close of program/project or in 3-year blocks for long term programs/projects. Transfer to records center storage. Transfer to National Archives 7 years after cutoff.	8000. 8/107. Temporary. Destroy/delete between 0 and 30 years after program/project termination. (see Note 2 below)	Project Manager designee (MSFC Repository is recommended)

TABLE I: CM RECORDS

Record Description	Projects Meeting Criteria in Note 1 (below): AFS Number, Schedule/ Item, Record Disposition	Projects Not Meeting Criteria in Note 1 (below): AFS Number, Schedule/ Item, Record Disposition	Record Custodian (typical)
CCB Agendas and Minutes	8000. 8/103. Temporary. Destroy/delete between 0 and 30 years after program/project termination. (see Note 2 below)	8000. 8/107. Temporary. Destroy/delete between 0 and 30 years after program/project termination. (see Note 2 below)	Project CCB Secretariat or designee
CCB Charter Memoranda	8000. 8/103. Temporary. Destroy/delete between 0 and 30 years after program/project termination. (see Note 2 below)	8000. 8/107. Temporary. Destroy/delete between 0 and 30 years after program/project termination. (see Note 2 below)	Project Management Support Assistant or Project CM Personnel
CCB/Program Control Number (PCN) change package data	Change package records may be dispositioned as either Schedule/Item 8/101 or 8/103. Each project should make a project-specific decision on which disposition(s) to use. 8000. 8/101. Permanent. Cut off records at close of program/project or in 3-year blocks for long term programs/projects. Transfer to records center storage. Transfer to National Archives 7 years after cutoff. NOTE: The NRRS Schedule 8 guidance identifies this disposition as appropriate for changes that affect form, fit, or function. 8000. 8/103. Temporary. Destroy/delete between 0 and 30 years after program/project termination. (see Note 2 below) NOTE: The NRRS Schedule 8 guidance identifies this disposition as appropriate for changes that do not affect form, fit, or function.	8000. 8/107. Temporary. Destroy/delete between 0 and 30 years after program/project termination. (see Note 2 below)	Project CCB Secretariat or designee
CM Accounting Reports and Data	8000. 8/103. Temporary. Destroy/delete between 0 and	8000. 8/107. Temporary. Destroy/delete between 0 and 30 years after	Project CCB Secretariat or designee

TABLE I: CM RECORDS			
Record Description	**Projects Meeting Criteria in Note 1 (below): AFS Number, Schedule/ Item, Record Disposition**	**Projects Not Meeting Criteria in Note 1 (below): AFS Number, Schedule/ Item, Record Disposition**	**Record Custodian (typical)**
	30 years after program/project termination. (see Note 2 below)	program/project termination. (see Note 2 below)	

Note 1: Project Criteria. Programs/Projects relating to both manned and unmanned space flight, aerospace technology research, and basic or applied scientific research AND meeting one or more of the following criteria: are "first of a kind," establish precedents, produce major contributions to scientific or engineering knowledge, integrate proven technology into new products, or are/have been subject of widespread media attention or Congressional scrutiny. (Excerpt from NRRS 1441.1, Schedule 8, Item 101).

Note 2: Choose Years From 0 to 30 Range. The intent of the "0 to 30 years" range is for the project office that owns the record to choose the appropriate number of years that the record is retained after project termination from within the "0 to 30 years" range. The specific number of years chosen per record type is recorded in the record plans specific to that project.

APPENDIX E
ROLES AND RESPONSIBILITIES

The following paragraphs define roles and responsibilities as they relate to CM. These roles and responsibilities are typical and may not apply to all programs/projects.

E.1 Program/Project Manager responsibilities are to:

a. Establish the requirements for a CM system that provides visibility and control of the functional and physical characteristics of a CI over the program/project life-cycle.

b. Ensure that the system is documented in a CMP.

c. Impose CM requirements in the contract for procured CIs.

d. Charter a configuration control board (CCB) and identify membership.

e. Approve the CMP.

f. Identify, with Chief Engineer and CM personnel, the CIs and computer software configuration items (CSCIs) and to be defined in associated documentation.

g. Identify contract and in-house CM data requirements.

h. Ensure configuration documentation is baselined and controlled.

i. Ensure project changes and deviations/waivers are reviewed and concurred by the appropriate Engineering Technical Authority (TA), Safety and Mission Assurance (SMA) TA, and Health and Medical TA.

j. Establish successive configuration baselines throughout program/project life-cycles.

k. Establish product traceability in accordance with MSFC-STD-555.

l. Ensure configuration verification and audits are conducted.

m. Ensure proper identification and disposition of records in accordance with NPR 1441.1.

E.2 Chief Engineer responsibilities are to:

a. Ensure the adequacy of inputs/outputs, technical specifications, and interface functions necessary to define the design-to requirements.

b. Ensure that the detail design meets development requirements and is documented and verified.

c. Serve as a mandatory member of Project CCBs.

d. Serve as Chairperson of Engineering Review Boards.

e. Serve as Chairperson of Level IV or Level V CCBs which control MSFC in-house design.

f. Evaluate and concur on all project changes, deviations, and waivers as part of MSFC's Engineering TA.

g. Ensure proper conduct of reviews and audits in accordance with MPR 7123.1.

h. Identify, with Program/Project Manager and CM personnel, the CIs and CSCIs to be defined in associated documentation.

NOTE: For small projects or activities, the Chief Engineer responsibilities may be assigned to the Lead Systems Engineer (LSE). For other projects, the Chief Engineer may delegate responsibilities to the LSE on an as-needed basis.

E.3 CM Personnel responsibilities are to:

a. Assist the Program/Project Manager in the establishment of a CM strategy.

b. Define the implementation of those requirements in a CMP. Formatting guidance is provided in MGM 7120.3.

c. Ensure the CM system is implemented in accordance with the CMP.

d. Identify, with Program/Project Manager and Chief Engineer, CIs, CSCIs, and associated configuration baselines.

e. Ensure release authority, release approvals, and Release Desk responsibility are assigned for each item of configuration documentation.

f. Ensure a CCB Secretariat and Receipt Desk are assigned and configuration control procedures are established.

NOTE: The Receipt Desk and Secretariat functions could be performed by one person or distributed between multiple people dependent on the size of the project or activity.

g. Participate in technical reviews.

h. Establish and maintain a configuration status accounting system.

i. Support the as-designed/as-built configuration comparison for MSFC in-house flight hardware/software in cooperation with SMA per project task agreement.

j. Support configuration verification and functional configuration audits (FCAs)/physical configuration audits (PCAs).

k. Plan and participate in CM audits.

l. Identify, disposition and maintain CM records.

E.4 SMA Directorate responsibilities are to:

a. Ensure appropriate SMA requirements are levied on the product, and that these requirements are in compliance with NASA, MSFC, and program/project requirements.

b. Provide mandatory SMA membership on CCBs.

c. Evaluate and concur on all project changes and deviations/waivers as part of the MSFC SMA TA.

d. Maintain and provide the as-built configuration definition for MSFC in-house developed flight hardware/software per project task agreement.

e. Support the as-designed/as-built configuration comparison for MSFC in-house flight hardware/software in cooperation with CM per project task agreement.

f. Provide SMA participation in technical reviews in accordance with MPR 7123.1.

g. Support FCA/PCAs or equivalent reviews as required.

E.5 Responsible Design Organization responsibilities are to:

a. Ensure that the product design meets the program/project requirements.

b. Ensure that the detail design has been documented in accordance with MSFC and program/project requirements.

E.6 In-House Software Developing Organizations (SDO) responsibilities are to:

a. Define software requirements and design in accordance with NPR 7150.2 and the guidance of IEEE 12207.

b. Submit documentation to the program/project CCB for control at project-specified milestones.

c. Maintain status of released software baseline versions and provide a software version description (SVD) for each software product release to the Program/Project Manager after the software is placed under configuration control.

d. Determine, with program/project agreement, when in the project lifecycle that the software product/SVDs are elevated from SDO control to program/project control.

E.7 CCB Chairperson responsibilities are to:

a. Ensure that the CCB is chartered and membership established.

b. Preside at CCB meetings and direct how the CCB meetings are conducted.

c. Disposition all changes processed through the CCB.

d. Designate which CCB Members are required to concur/nonconcur on each change.

E.8 CCB Members responsibilities are to:

a. Support the program/project in evaluating changes and provide impacts in their area.

b. Advise the CCB Chairperson on change disposition.

c. Concur/nonconcur on change disposition and implementation actions as required by the CCB Chairperson.

E.9 CCB Secretariat responsibilities are to:

a. Ensure changes are received and accounted for.

b. Ensure screening of changes for completeness and assignment to a CCB.

c. Ensure a change package engineer (CPE) and evaluators are assigned to review data.

d. Schedule and monitor the control process to ensure tasks are completed in a correct and timely manner.

e. Coordinate with the CPE to ensure CPE preparation of a recommended disposition for the CCB.

f. Create CCB agendas and minutes.

g. Document CCB disposition and implementation actions, obtain appropriate board member concurrence and board chairperson authorization.

h. Track board actions and implementation actions to closure.

i. Ensure accounting and change package records are established and maintained.

APPENDIX F
GUIDANCE FOR CONFIGURATION MANAGEMENT PLANNING

F.1 Purpose. This appendix provides guidance for Configuration Management planning, including preparation and maintenance of a Configuration Management Plan (CMP), resource task planning, tool selection, and training.

F.2 Applicability. This appendix applies to MSFC in-house programs/projects.

F.3 Related Requirements. Requirement 2.2.14.1 of MPR 7123.1.

F.4 Related Functions/Roles. Related functions/roles include the Program/Project Manager, and CM personnel.

F.5 CM Planning Guidance. The purpose of CM planning is to plan and manage the CM processes necessary for the context and environment in which CM is to be performed, and to provide for monitoring and improvement of CM processes. A strategy for conducting configuration management for configuration items and configuration data is prepared and documented in a CMP. The Program/Project Manager provides direction for CM planning and preparation and implementation of the CM Plan (CMP).

F.5.1 CMP. The CMP addresses configuration identification, control, accounting, verification and audits, and any unique CM requirements for the specific program/project. The CMP also identifies the CM functional responsibilities assigned to various organizational elements (see Appendix E for a detailed list of typical role/responsibility assignments).

F.5.2 CMP Preparation and Maintenance.

a. An MSFC in-house CMP is prepared in accordance with the Standard (STD) Data Requirements Description (DRD) for a Configuration Management Plan, STD/CM-CMP. A Software CMP (SCMP) is prepared in accordance with the DRD for a Software Configuration Management Plan, STD/SW-SCMP.

b. The CMP is maintained current through the program/project life cycle.

c. The program/project should include the MSFC CM policy organization (EE12/Configuration and Data Management Office) as mandatory reviewers for the initial issue and major revisions of MSFC-prepared CMPs and as either mandatory or optional reviewers for contractor-prepared CMPs.

F.5.3 Tailoring. Depending on the size, complexity, criticality, and risk of the program/project, the CMP can reside as a stand-alone document or be incorporated into the Systems Engineering Management Plan (SEMP) or the Program/Project Plan.

F.5.4 Resource Task Planning. An essential part of CM planning is to identify resources required to implement the CM processes and ensure they are applied throughout the program/project lifecycle. Resources are identified and assigned to perform the activities identified in the CMP, and may include personnel, information systems, office equipment or tools, among others. It is the responsibility of the program/project, with input from the Configuration and Data Management Office to assess and identify the required CM tasks and to obtain CM personnel staffing through the program/project and Center processes. The resources and tasks required will vary depending on program/project size and complexity.

F.5.5 CM Tool Selection. The program/project should select appropriate tools and methodologies to implement CM processes. Because data is delivered and stored in electronic media, a key element of CM planning is to choose tools or methodology for implementing CM in an electronic environment. It is recommended that the tool/methodology chosen meets the project's CM needs throughout the project life cycle, provides capability to baseline/release and process changes against all types of project data, be accessible from any location in which personnel need to interface with the system to perform work, provides a secure environment meeting NASA security requirements, and be integrated with project data systems so CM controls are applied to data within the secure environment.

F.5.6 CM Training. Training should be conducted so that individuals understand their responsibility, authority, accountability, and the processes and procedures for performing CM tasks. CM Training is a continuing process that addresses both performance of assigned CM tasks and cross-training to provide awareness of relationships and interactions with others having CM-related responsibilities.

APPENDIX G
GUIDANCE FOR CONFIGURATION IDENTIFICATION

G.1 Purpose. This appendix provides guidance for configuration identification, including selecting CIs/CSCI, identifying required configuration documentation, assigning identifiers, and establishing baselines.

G.2 Applicability. This appendix applies to both MSFC in-house programs/projects and MSFC managed contracted projects.

G.3 Related Requirements. Requirement 2.2.14.2 of MPR 7123.1.

G.4 Related Functions/Roles. Related functions/roles include the Program/Project Manager, CM personnel, Chief Engineer, and responsible design organizations.

G.5 Configuration Identification Guidance. Configuration identification is the systematic process of selecting CIs/CSCIs and establishing a definitive basis for their control, status accounting, and verification throughout their lifecycle. Identification requires unique identifiers for a product and its configuration documentation. The CM activity associated with identification includes selecting configuration documentation, assigning and applying unique identifiers to a product, its components, and associated documents; and maintaining document revision relationships to product configurations or baselines. The following paragraphs provide guidance and pointers to detailed requirements for performing configuration identification for a program/project.

G.5.1 CI and CSCI Identification. Typically, the Program/Project Manager, Chief Engineer, CM personnel, and the responsible design organizations are responsible for identifying the CIs and CSCIs which are subject to configuration management. Once identified, a list of CIs/CSCIs to be managed is established, baselined and maintained. For MSFC in-house design released through the MSFC Release Desk, the CI list should be prepared in accordance with MSFC-STD-555. For other CIs, the CI list may be located in the CM Plan or other project-authorized document. The CI list should be approved prior to the first release which is made effective against the CIs.

G.5.2 Configuration Documentation. Configuration documentation describes the performance, functional and physical attributes of a CI/CSCI, including requirements information and design information. Configuration documentation used to define requirements/design for CIs and CSCIs, both MSFC-developed or contractor-developed, include specifications (hardware and software), interface documentation (hardware and software), drawings, Software Version Descriptions (SVDs), and associated data.

G.5.2.1 MSFC Document Preparation. Guidance for the preparation of MSFC-produced configuration documentation is provided in MGM 7120.3.

a. System requirements or specifications should meet the expectations of STD/SE-RQMTSPEC. Detailed specification content should meet the requirements of MIL-STD-961.

b. Requirements for drawings and parts lists are identified in MSFC-STD-555.

G.5.2.2 Contractor Documentation. Requirements for contractor configuration documentation are contained in the individual contract and MSFC-STD-3394, which requires specifications to comply with MIL-STD-961 and drawings and parts lists to comply with ASME Y14.100.

G.5.3 Product Identification and Traceability. Requirements for product identification and traceability are identified in MSFC-STD-555 for MSFC Mission Types 1 and 2 in-house design release. Requirement for product identification and traceability for CIs developed or maintained by a contractor(s) are identified in MSFC-STD-3394.

G.5.4 Baseline Identification. Configuration baselines provide for the progressive definition and documentation of the requirements and design information describing the various CIs/CSCIs designated for a system. Each baseline defines the agreed to attributes at a specific time, and provides the basis for managing change to that set of attributes. MSFC program/project and design activities establish functional, allocated, and product baselines by baselining configuration documentation throughout the program/project lifecycle. Major technical reviews and audits required by MPR 7123.1 (e.g., System Requirements Review, Preliminary Design Review, Critical Design Review (CDR), or PCA) are typically used to ensure configuration documentation is correct and mature prior to baseline establishment.

G.5.5 Release. A release system provides the formal release of configuration documentation to all stakeholders. MPR 7123.1 requires a single point of release for each item of configuration documentation be established. The organization with release authority may be MSFC or a contractor. Requirements for MSFC Mission Types 1 and 2 in-house design release are identified in MSFC-STD-555. Requirements for contractor release are identified in MSFC-STD-3394 or equivalent contract requirements. It is recommended that a release process address the following:

a. Format and numbering requirements for data to be released.

b. Review and authorization required prior to release.

c. Roles and responsibilities within the release process, including a Release Desk function.

d. Version control and traceability of release history.

e. Availability of the latest released versions to users.

f. Maintenance of the released data as records in accordance with NPR 1441.1.

APPENDIX H1
GUIDANCE FOR CONFIGURATION CONTROL

H1.1 Purpose. This appendix provides guidance for the control of hardware, and software configuration documentation for which MSFC has responsibility.

H1.2 Applicability. This appendix applies to MSFC in-house programs/projects and to MSFC managed contracted projects to the extent identified below.

H1.3 Related Requirements. Requirement 2.2.14.3 of MPR 7123.1.

H1.4 Related Functions/Roles. Related functions/roles include the Program/Project Manager, CM personnel, and CCB Secretariat.

H1.5 Configuration Control Guidance. Configuration control is change management or controlling changes to a product using a systematic change process. Configuration control is implemented to ensure that:

a. Configuration baselines are maintained and controlled.

b. CIs and CI configuration documentation are kept consistent.

c. Change information is communicated in an orderly manner.

d. Cost, savings, and alternative change trade-offs are evaluated.

e. Change decisions are based on knowledge of complete change impact.

f. Changes are limited to those which are necessary or offer significant benefit.

g. Product interfaces are controlled.

H1.5.1 Configuration Control Process. The Program/Project Manager, Chief Engineer, and designated CCB members are responsible for configuration control. Configuration control begins with the establishment of initial configuration baselines and continues through the program/project lifecycle. The configuration control process includes:

a. Establishing configuration control boards.

b. Identifying the need for a change.

c. Defining the change.

d. Documenting change impact.

e. Evaluating and coordinating the proposed change (including approval/disapproval).

f. Incorporating the approved change in the CI and/or its related configuration documentation.

g. Verifying change incorporation and continued consistency with the configuration documentation.

h. Identifying, documenting, approving, and implementing deviations/waivers.

The following paragraphs provide typical configuration control processes. This information is intended for guidance only and programs/projects are responsible for determining implementation. Contract requirements for configuration control are identified in MSFC-STD-3394 and the contract data requirement descriptions.

H1.5.2 Configuration Control Board (CCB). CCBs are established to control and authorize baselines, changes, deviations, and waivers to configuration documentation. Detailed guidance for establishing a CCB and definitions of CCB Levels is provided in Appendix H2.

H1.5.3 Control and Release Identifiers.

H1.5.3.1 Identifiers Assigned by the MSFC Release Desk. To ensure unique identification of change data and to be consistent with the requirements for the release system utilized by the MSFC Release Desk, the following identifiers should be requested from the MSFC Release Desk and assigned in accordance with MSFC-STD-555.

H1.5.3.1.1 Project Code. The project code is used as part of the program control number (PCN), the board code, and the effectivity identifiers. Use of the project code in these numbers aids visibility of the project/product identification on the change package data within the release database.

H1.5.3.1.2 Board Code. The board code provides a unique identifier for each project board, and it is used as the base for the control board directive number.

H1.5.3.1.3 CI and Effectivity Identifiers. CI and effectivity identifiers are assigned by the organization that has release authority for the CI detailed design data. For MSFC in-house design, CI and effectivity identifiers are assigned for each CI in accordance with the requirements of MSFC-STD-555. For contracted CI's, the CI and effectivity identifiers may be assigned in accordance with the contractor's procedures.

H1.5.3.2 Identifiers Assigned by the Project CM Personnel. The Project CM personnel (could be the Board Secretariat or Project Release Desk) should establish assignment logs for the following identifiers.

H1.5.3.2.1 Control Board Directive (CBD) Number. The CBD number should be a unique for each control board directive. For changes processed through the MSFC Release Desk, the CBD

number scheme should be established in accordance with MSFC-STD-555. For projects that do not use the MSFC Release Desk, the CBD number scheme in MSFC-STD-555 is optional but may be used.

H1.5.3.2.2 PCN. The PCN provides a unique number per change package. For projects utilizing the MSFC Release Desk, the PCN numbering scheme should be in accordance with MSFC-STD-555. For projects that do not use the MSFC Release Desk, the PCN number scheme in MSFC-STD-555 is optional but may be used.

H1.5.4 Change Package Files. CM personnel establish and maintain CCB change package files, also called PCN files.

H1.5.4.1 Unique Change Package Number Assignment. The CCB Secretariat assures a unique PCN number, is assigned to each change package.

H1.5.4.2 Change Package Content in Chronological Order. The elements of the change package are filed in chronological order within the change package file. If filed electronically, the change package elements should be sortable or reportable chronologically.

H1.5.4.3 Change Package Content. As a minimum, the following information should be included:

a. The change request (CR), engineering change request (ECR), engineering change proposal (ECP), deviation/waiver approval request (DAR), etc.

b. CBD or board change evaluation (BCE), whichever is appropriate.

c. CPE's consolidated change evaluation (CE).

d. Mandatory BCEs or CBDs from lower level boards, if applicable.

e. Contractor CE/response, if applicable, and MSFC contractual direction.

f. CBD implementation actions and action closure data.

g. Minutes of CCB meeting where change package elements were dispositioned.

H1.5.5 Change Documentation and Submittal. The need for a change is identified to the office of primary responsibility via a CR, ECR, ECP or DAR.

H1.5.5.1 CR/ECR/ECP. MSFC-initiated changes are documented on a CR or ECR, MSFC Form 2327 or a program/project equivalent format, and submitted to the Receipt Desk or CCB Secretariat associated with the CCB that has authority over the CI-documentation being changed. Changes originated by a contractor are documented on an ECP, MSFC Form 2348 or equivalent

format, and submitted to the Government contracting officer (CO). It is recommended that the contractor provide a copy of the ECP to the CCB Secretariat in parallel to the CO to expedite processing.

a. Interface Control Document (ICD) Changes. For changes to an ICD, the changes are documented on MSFC Form 4229 or equivalent format, and attached to the CR or ECR. For Interface Revision Notice (IRN)/Preliminary Interface Revision Notice (PIRN) processing, see MSFC-STD-555.

b. Engineering Orders (EOs) and Floor Changes. Requirements for processing EOs and Floor EOs for MSFC Mission Types 1 and 2 In-house design release are contained in MSFC-STD-555.

H1.5.5.2 DAR. Deviations and waivers are documented as a DAR in accordance with Appendix H3.

H1.5.6 Change Criteria. Changes, deviations, and waivers are limited to those which offer significant benefit and meet one or more of the following:

a. Correct safety, design, and performance deficiencies.

b. Satisfy change in operational or support requirements.

c. Effect overall cost savings.

d. Prevent or control program/project slippage.

e. Implement design improvements.

f. Implement performance requirement changes.

g. Establish or maintain interface compatibility.

H1.5.7 Change Priority. Change priorities are assigned by the change initiator, with a proposed priority of emergency, urgent, or routine in accordance with the following criteria:

a. Emergency. The change initiator assigns this priority if the proposed change is to correct a safety condition that could result in fatal or serious injury to personnel or in extensive damage to, or destruction of, equipment.

b. Urgent. The change initiator assigns this priority if the proposed change is to correct a potentially-hazardous condition which, if uncorrected, could result in injury to personnel or in damage to equipment and reduction of mission effectiveness. A potentially-hazardous condition that compromises safety and embodies risk, but within reasonable limits, permits continued use

of the affected item provided the operator has been informed of the hazard and appropriate precautions have been defined and distributed to the user. Use this priority for the following:

(1) Changes necessary to meet schedules when longer lead time would necessitate slipping baselined production, activation, or construction schedules.

(2) Mission capability changes when delay would compromise the mission capability and result in unacceptable contract, production, or mission launch schedules.

(3) Changes associated with interface problems resulting from compatibility changes made by other design activities or contractors.

c. Routine. The change initiator assigns this priority to a proposed change when *Emergency* or *Urgent* is not applicable.

(1) The priority is used to determine the relative timeframe in which the changes are to be dispositioned by MSFC. Recommended MSFC processing times allocated from initial submission to the CCB Secretariat through CBD disposition for each priority level are as follows:

Priority	Process Time
Emergency	< 48 hours
Urgent	14 calendar days
Routine	28 calendar days

H1.5.8 CR and Accounting. CM personnel enter the change status and accounting data into the program/project approved tracking system.

H1.5.9 Change Screening. The screening function is composed of one or more project personnel and is responsible for reviewing the change to identify mandatory evaluators and to recommend a CCB schedule.

H1.5.10 Change Notification. CM personnel notifies CCB members and evaluators of the change. Minimum information provided with the notification should include:

a. The Change, or Change Identification and Access Location.

b. Designated CPE.

c. Date Evaluations are Required.

d. Distribution List.

e. Planned CCB Date.

H1.5.11 Change Evaluation. The evaluators complete their evaluation on MSFC Form 516, or project-specified format, and submit it to the CCB Secretariat and CPE within the specified schedule.

H1.5.12 CPE Change Recommendation. The CPE performs the following:

a. Consolidate all technical and programmatic evaluations.

b. Formulate a recommendation for the CCB.

c. Forward CCB recommendation to CCB Secretariat for draft CBD.

d. Prepare CCB presentation in accordance with program/project requirements.

H1.5.13 Draft CBD. The Secretariat drafts the CBD to reflect the CPE recommended disposition, including specific documentation changes not captured in the original change request, and the actions required to implement the change. The CBD is documented on MSFC Form 2312 or equivalent format.

H1.5.14 CCB Meeting Agenda. The CCB Secretariat prepares and distributes a CCB agenda with the following minimum information:

a. CCB date and location.

b. Listing of changes to be presented to the CCB by change number, title, and effectivity.

c. CPE for each change.

d. A listing of outstanding actions scheduled for the CCB meeting.

NOTE: CCB Chairpersons may disposition changes outside the CCB, but it is highly recommended that the CCB be held to identify and resolve all issues with a change.

H1.5.15. Change Disposition and CBD.

H1.5.15.1 CPE Presentation. The CPE presents the change to the CCB.

H1.5.15.2 CCB Chairperson Disposition. The CCB Chairperson dispositions (approved, approved with changes, or disapproved) the change on a CBD or BCE (for submission to a higher level CCB).

H1.5.15.2.1 CCB Member Concurrence/Nonconcurrence. The CCB Chairperson designates which CCB members are required to concur or nonconcur on each CBD; the CCB Chairperson may disposition the change without any CCB member concurrence/nonconcurrence if they choose.

a. CCB members indicate their concurrence/nonconcurrence on the CBD or BCE.

b. Nonconcurrences include rationale.

H1.5.15.2.2 CBD Routing Outside CCB Meeting. If the CBD or BCE cannot be completed during the CCB meeting, the CCB Secretariat completes and routes after the CCB.

H1.5.16 Change Package Accounting. The CCB Secretariat retains the official change package and the official record copy of the CBD or BCE (paper or electronic file).

H1.5.17 CCB Meeting Minutes. The CCB Secretariat prepares and distributes minutes of each CCB meeting and includes, as a minimum, the following information:

a. Date and Location.

b. List of Attendees.

c. List of Agenda Items and their Disposition.

d. Non-CBD action items assigned during the CCB, including actionee(s) and suspense date(s).

H1.5.18 CBD Actions Accounting.

a. The CBD actionees implement CBD actions and provide closure data to the CCB. Closure data may be presented during a board meeting or submitted directly to the CCB Secretariat depending on direction from the Board Chair.

b. The CCB Secretariat monitors closure actions and provides action item status to the CCB Chairperson. Status of directive actions are often given at the CCB meetings but could also be provided directly to the CCB Chair depending on the Chair's preference.

H1.5.19 Change Process Flow. Figure 1 gives a generalized representation of a typical process flow for a change.

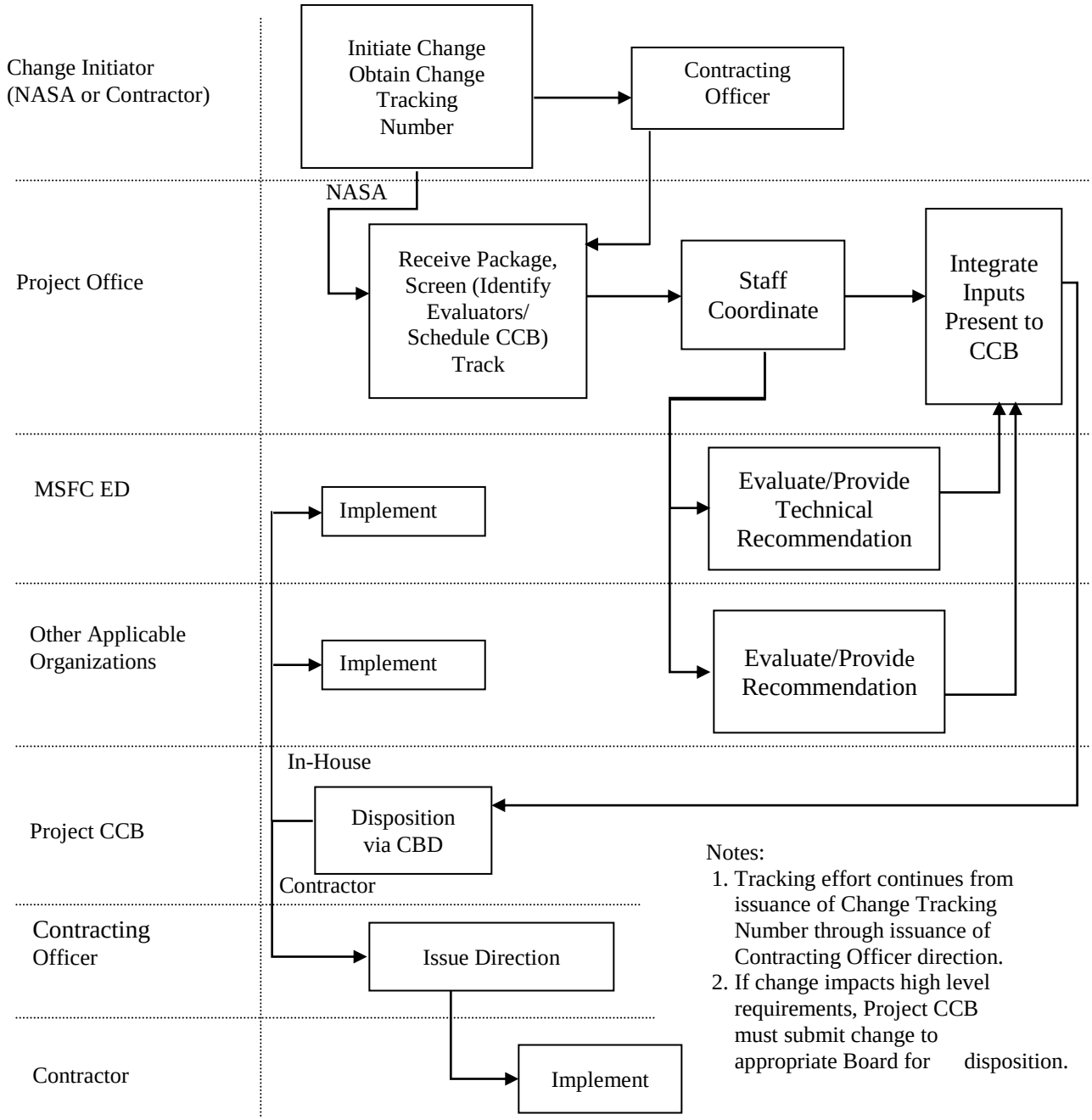

Figure 1 Change Process Flow

APPENDIX H2
GUIDANCE FOR CONFIGURATION CONTROL BOARDS

H2.1 Purpose. This appendix provides guidance for establishing CCBs and definitions of various CCB Levels

H2.2 Applicability. This appendix applies to MSFC in-house programs/projects.

H2.3 Related Requirements. Requirement 2.2.14.3 of MPR 7123.1.

H2.4 Related Functions/Roles. Related functions/roles include the Program/Project Manager, CCB Chairperson (if not Program/Project Manager), and CCB Secretariat.

H2.5 CCB Guidance. The CCB is a program/project management function used to ascertain all the benefits and impacts of a change before the decision is made. The CCB is usually chaired by the program/project manager. The CCB Chairperson is responsible for making the decisions concerning all changes brought before the CCB. The following paragraphs describe typical board structures. This information is intended for guidance only and programs/projects are responsible for determining implementation.

H2.5.1 CCB Establishment. CCBs are established to control and authorize baselines, changes, deviations, and waivers to configuration documentation. The CCB Chairperson establishes a CCB Charter and identifies the CCB membership. At a minimum, the membership should include a Chairperson, Alternate Chairperson, Secretariat, SMA, Chief Engineer, and Procurement (if the CCB controls a contracted CI).

H2.5.2 CCB Levels. A multilevel configuration control system is established when authority for management and development of CIs comprising a system is assigned to multiple organizations. The Program/Project Manager defines the authority of each organization (CIs, configuration documentation, or cost). Each organization that is authorized to control a CI baseline charters a CCB to establish configuration baselines and disposition changes, deviations, and waivers to those baselines. Lower-level CCBs prepare and process evaluations and prepare recommendations to higher-level CCBs for baselines established at these higher levels. The typical levels of control and authority are established as indicated below. The level numbers and names vary for specific program/project application dependent on the program type (e.g., single project program, tightly coupled program, loosely coupled program).

Level	Authority
I	NASA Headquarters
II	Program/Lead Center
III	Project Manager
IV	Project Manager or Chief Engineer
V	Chief Engineer, Design Organization, or Contractor

H2.5.2.1 Level I CCB. The Level I CCB is established by authority of the NASA Headquarters Program Associate Administrator and chaired by the NASA Headquarters Program Associate Administrator, or designee. This CCB is the controlling authority of all baselines and changes to the Level I program requirements. Functions, duties, and membership of the Level I CCB are established by the NASA Headquarters Program Associate Administrator. Level I CCB support at MSFC is through the appropriate lower-level CCBs.

H2.5.2.2 Level II CCB Outside MSFC. When another NASA Center is designated as the Lead Center for a program with elements at various Centers, including MSFC, the Lead Center Program Manager establishes a Level II CCB. MSFC support of Level II CCBs residing at locations other than MSFC is executed through the appropriate Level III CCB.

H2.5.2.3 Level II CCB at MSFC. When MSFC is designated as the Lead Center for a program with elements at various NASA Centers, the Level II CCB is established at MSFC. The MSFC Level II CCB is the authority for establishing configuration baselines and changes to these configuration baselines. The Level II CCB submits all actions affecting Level I requirements to the Level I CCB with a recommended disposition.

H2.5.2.4 Level III CCB. Managers for project offices establish Level III CCBs to establish configuration baselines and control changes to these baselines. Level III CCBs submit all changes affecting Level I or Level II requirements to the Level II CCB with a recommended disposition. Level III reviews Level II CRs and submits a consolidated CE to Level II.

H2.5.2.5 Level IV CCB. Managers for Project Offices authorize the establishment of a Level IV CCB, if necessary, designate the Chair, and identify the baseline level to be controlled by the Level IV CCB. Level IV submits all changes affecting Levels I, II, or III requirements to the Level III CCB with a recommended disposition. The Level IV CCB reviews Level II and III CRs, ECRs, and ECPs and submits a consolidated change evaluation to Level III.

APPENDIX H3
GUIDANCE FOR DEVIATION/WAIVERS

H3.1 Purpose. This appendix provides guidance for generating, processing, and implementing deviations and waivers to specified requirements for MSFC program/project CIs or CSCIs.

H3.2 Applicability. This appendix applies to both MSFC in-house programs/projects and MSFC managed contractor projects.

H3.3 Related Requirements. Requirements 2.2.14.3 of MPR 7123.1.

H3.4 Related Functions/Roles. Related functions/roles include the Program/Project Manager, CCB Secretariat, program/project CM personnel, Chief Engineer, and SMA.

H3.5 Deviation/Waiver Guidance. The following paragraphs provide typical processes for deviations and waivers. Deviations are processed prior to manufacture and, once approved, provide authorization to depart from a particular requirement of a CI's approved configuration. Waivers are processed after manufacture and, once approved, provide authorization to accept a CI that departs from one or more requirements of the CI's approved configuration.

The information below is intended for guidance only and programs/projects are responsible for determining implementation. The project should determine the relationship between deviations/waivers and nonconformances dispositioned by a Material Review Board (MRB).

H3.5.1 DAR Process. The initiator identifies the need for a deviation/waiver and documents it on a DAR, MSFC Form 847 or program/project equivalent format. The program/project reviews the DAR for completeness and submits it to the change control process in accordance with Appendix H1. The CO has final approval of all contract DARs. For in-house Programs/Projects, SMA verifies that the approved DAR is incorporated into the CIs as-built configuration records. For contracted CIs, the CO implements the approved DAR into the appropriate contract.

H3.5.2 CCB Versus MRB Authority for MSFC In-house Hardware. The following paragraphs define the typical split of authority between the project CCB and project MRB related to the disposition of nonconformances identified in or affecting hardware designed and built in-house at MSFC. See MPR 8730.3 for definition of terms related to the MRB process.

H3.5.2.1 CCB Nonconformance Disposition. If a nonconformance affects a critical or major characteristic and the proposed disposition is Repair or Use-As-Is, a DAR is required to be prepared. The DAR is dispositioned by the control board that holds authority over the CI baseline.

H3.5.2.2 MRB Nonconformance Disposition. As described in MPR 8730.3 and MWI 8730.3, the MRB dispositions nonconformances that affect minor characterisics.. The MRB responsibility is to exercise good judgment to ensure; (1) that technical requirements are not

degraded; and (2) that any nonconformance that is dispositioned as minor does not affect critical or major characteristics such as design, performance, safety, or baseline of the product.

NOTE: When a change is authorized by the CCB as effective for specific units of hardware, the MRB should not disposition changes which are not incorporated as a minor nonconformance. Effectivity changes may only be authorized by the controlling board.

APPENDIX H4
GUIDANCE FOR PRODUCT CONFIGURATION CONTROL AT REMOTE LOCATIONS

H4.1 Purpose. This appendix provides guidance for processing Field Engineering Changes (FECs), Mod Kits, and Software Updates.

H4.2 Applicability. This appendix applies to MSFC design activities and contractor design activities as indicated below.

H4.3 Related Requirements. Requirement 2.2.14.3 of MPR 7123.1.

H4.4 Related Functions/Roles. Related functions/roles include the Program/Project Manager, CM personnel, and using site/design organization personnel.

H4.5 Guidance. The following paragraphs provide typical processes for FECs, mod kits and software updates. This information is intended for guidance only and programs/projects are responsible for determining implementation.

H4.5.1 Field Engineering Changes (FEC).

H4.5.1.1 Need for FEC. The purpose of a FEC is to propose engineering changes on equipment at NASA Using Sites for which MSFC retains design responsibility and when time is not adequate to prepare and process an engineering change. The Using Site activity identifies the need for an FEC and the proposed implementation.

H4.5.1.2 FEC Pre-Coordination. The FEC is pre-coordinated with the MSFC onsite representative or the MSFC program/project office.

H4.5.1.3 FEC Generation. The MSFC Using Site generates the FEC to contain the minimum data list in H4.5.18.5, and transmits the FEC to the program/project office for concurrence.

H4.5.1.4 Program/Project Concurrence. The program/project office provides concurrence/nonconcurrence to the Using Site activity.

H4.5.1.5 FEC Content. Minimum FEC Data includes:

a. FEC Number.

b. Version or Revision.

c. PCN.

d. Problem Report Number.

e. Initiation Date.

f. Change Title.

g. Top Assembly Number and Nomenclature.

h. Part Number(s) Affected.

i. Serial Number/Lot Number.

j. Effectivity.

k. Change Justification.

H4.5.1.6 Design Data Affected by the FEC.

H4.5.1.6.1 MSFC Design Activity CR. If MSFC is the design activity, then the office of primary responsibility prepares a CR for baselined design changes resulting from an FEC.

H4.5.1.6.2 Contractor Design Activity ECP. If the design activity is a contracted effort, then the contractor implements an ECP in accordance with MSFC-STD-3394 for each FEC.

H4.5.1.6.3 Updated Design Data Provided to Using Site. The MSFC CCB Secretariat notifies the Using Site of design baseline updates and provides updated design data to the Using Site.

H4.5.1.7 Using Site FEC Implementation. The Using Site is responsible for:

a. Implementing the FEC.

b. Tracking, statusing, providing closure, and maintaining records for the FEC.

c. Providing the MSFC CCB Secretariat FEC installation and verification data for the change package/PCN file.

H4.5.2 Mod Kits.

H4.5.2.1 Need for Retrofit. The Using Site or Design organizations identify the need for retrofit after receipt/delivery of a CI.

H4.5.2.2 Retrofit CR. Design activity generates a change request to describe the change to baseline documentation required by the retrofit.

H4.5.2.3 Mod Kit Generation. After change request approval (in-house), the design activity generates a mod kit documentation package including a mod kit parts list, installation instructions, and validation requirements. For contractor modifications, the following apply:

a. The mod kit documentation package is included with the ECP, in accordance with MSFC-STD-3394.

b. The mod kit instructions are in accordance with contractual requirements.

H4.5.2.4 Mod Kit Instructions Content. Mod kit instructions, for in-house design activity, include the following:

a. Title.

b. Mod Kit Instruction Number.

c. Authorization.

d. Creation Date.

e. Mod Kit Proofed.

f. Where Work is to be Performed.

g. Installation Sequence.

h. Spares Affected.

i. Manuals Affected.

j. Safety Considerations.

k. Purpose of the Mod Instruction.

l. Effectivity.

m. Parts/Material Documentation Required.

n. Instructions for Accomplishing the Mod.

o. Nameplate.

p. Special Packaging and Handling Instructions.

q. Special Tools, Safety Equipment, or Test Equipment.

r. Disposition of Removed Parts.

s. Estimated Man-hours Required.

t. Verification/Validation Requirements.

u. Prepared By.

v. Inspected By.

w. Software Requirements.

x. Copy of Mod Kit Instructions with each Serialized CI.

H4.5.2.5 Mod Kit Shipping. The design activity ships mod kit (software and hardware) and documentation package. Shipment shortages should be rectified by partial mod kit shipments as required.

H4.5.2.6 Retrofit/Modification Implementation. The Using Site activity implements retrofit/modification in accordance with mod kit instructions.

H4.5.2.7 Mod Kit Installation and Verification Information. The Using Site completes the kit installation and verification information and forward to the program/project office's CM personnel/CCB Secretariat. Kit installation and verification information may be recorded on MSFC Form 2490 or equivalent format.

H4.5.2.7.1 Content of Mod Kit Installation and Verification Information. Installation documentation contains the following minimum information:

a. Mod Kit Number.

b. CR/ECP Number that Authorized the Modification.

c. Part Number Modified or the New Part Identification (if the mod caused a part number change).

d. Date and Location of Installation.

e. Serial Number of the Item.

f. Work Order Number (if applicable).

g. Name, Address and Telephone Number of the Person Responsible for the Installation.

h. Date and Location of the Verification.

i. Name, Address and Telephone Number of the Person Responsible for the Verification.

j. Name, Address and Telephone Number of the Government Inspector.

k. Any Additional Remarks to Clarify the Installation/Verification.

H4.5.2.7.2 Inclusion in Accounting and Change Package. The CCB Secretariat receives the mod kit installation and verification information and incorporates this information into the approved accounting system and the Change Package/PCN files.

H4.5.3 Software Update Instructions.

H4.5.3.1 Need for Software Update. The Using Site or Design Organizations identify the need for software update after receipt/delivery of a CSCI.

H4.5.3.2 Software Update CR. Design activity generates a change request to describe the change to baseline documentation required by the software update.

H4.5.3.3 Software Update Package Generation. After change request approval (in-house), the design activity generates a software update documentation package including an SVD Document. For contractor software update, the software update documentation package is in accordance with the contract requirements.

H4.5.3.4 Software Update Package Content. The software update package, for in-house design activity, includes the following:

a. Title.

b. Software Version Number.

c. Authorization.

d. Creation Date.

e. Installation Site.

f. Installation Sequence.

g. Operational Manuals Affected.

h. Safety Considerations.

i. Purpose of the Software Update.

j. Effectivity.

k. Documentation Required.

l. Instructions for Installation.

m. Special Test Equipment.

n. Estimated Man-hours Required.

o. Validation Requirements.

p. Installed By.

q. Tested By.

r. Software Requirements.

s. Copy of the Software Update Package with each Serialized CSCI.

H4.5.3.5 Software Update Package Shipping. The design activity ships software update and documentation package. Shipment shortages are rectified by partial mod kit shipments, as required.

H4.5.3.6 Software Update Implementation. The Using Site activity implements the software update in accordance with the instructions.

H4.5.3.7 Software Update Installation and Verification Information. The Using Site complete the software update installation and verification information and forward to the program/project office's CM personnel/CCB Secretariat. This information may be recorded on an MSFC Form 2490.

H4.5.3.7.1 Content of Software Update Package Installation and Verification Information. Using-site format is acceptable but should contain the data items listed as follows:

a. Software Version Number.

b. CR/ECP Number that Authorized the Software Update.

c. Date and Location of Software Update Installation.

d. Work Order Number (if applicable).

e. Serial Number of the Item.

f. Name, Address and Telephone Number of the Person Responsible for the Installation.

g. Date and Location of the Verification.

h. Name, Address and Telephone Number of the Person Responsible for the Verification.

i. Any Additional Remarks to Clarify the Installation/Verification.

H4.5.3.7.2 Inclusion in Accounting and Change Package. The CCB Secretariat receives the software update installation and verification information and incorporates this information into the approved accounting system and the Change Package/PCN files.

APPENDIX I
GUIDANCE ON CONFIGURATION ACCOUNTING

I.1 Purpose. This appendix provides guidance for configuration accounting, which includes release accounting and configuration status accounting.

I.2 Applicability. This appendix applies to MSFC in-house programs/projects.

I.3 Related Requirements. Requirement 2.2.14.4 of MPR 7123.1.

I.4 Related Functions/Roles. Related functions/roles include the Program/Project Manager and project CM personnel.

I.5 Configuration Accounting Guidance. Configuration accounting is the process of creating and organizing the knowledge base necessary for the performance of configuration management. It provide a highly reliable source of configuration information to support all program/project activities including program management, systems engineering, manufacturing, software development and maintenance, logistic support, modification, and maintenance. Configuration accounting ensures:

a. Data about the product and its configuration information is captured as the product evolves through its life cycle.

b. Retrieval of current, accurate information including change decisions and design changes

c. Access to complete product configuration information

d. Historical traceability of product configuration and its configuration information.

Configuration accounting includes release accounting and configuration status accounting. Per MPR 7123.1, MSFC Programs/Projects have the responsibility for establishing program/project specific configuration accounting requirements. Contract requirements for configuration accounting are contained in MSFC-STD-3394. The following paragraphs provide typical processes needed for in-house design and manufacturer.

I.5.1 Release Accounting.

a. Release accounting records the current released status and release history of all released items.

b. Each release identifies the data (documents/drawings/databases) released, the authorization for release, whether the release is an initial release or a change release, the CI or system affected (with effectivities), and date of release.

c. Release capability for MSFC in-house projects is provided through the MSFC Release Desk and meets the release requirements identified in MSFC-STD-555 and the configuration accounting requirements identified in MPR 7123.1.

d. A release system should be capable of capturing and producing the following information:

(1) The composition of any part number at any level in terms of subordinate part numbers.

(2) All next higher or next assembly part numbers in which the part is used.

(3) The CI number and effectivity on which any subordinate part is used.

(4) The as-designed configuration product structure in such a format that can be compared with the as-built configuration provided by SMA.

I.5.1.1 Data Elements Included in a Release System.

I.5.1.1.1 Elements of Data for Hardware Items. The following information is recommended to be included in release records for hardware items:

a. CI Elements

1) Item number.
2) Item serial number(s) (Effectivity).
3) Top drawing number.
4) Item specification identification number.

b. Drawing Elements

1) Drawing number.
2) Drawing title.
3) CAGE code.
4) Number of sheets.
5) Date of release.
6) Drawing change or revision letter and release date of authorizing document which directed the change or revision.
7) Ancillary document numbers; (e.g., engineering change notices, engineering orders).
8) Specification document, specification control drawing, or source control drawing number.

c. Part Number Elements

1) Controlling drawing number.
2) Part numbers released.
3) Identification of change that created the part number.

I.5.1.1.2 Elements of Data for Software Items. Reference the CSCI SVD document that contains the elements required in the release records.

I.5.2 Configuration Status Accounting (CSA).

I.5.2.1 CSA Functions. The project/program CM personnel are responsible for configuration status accounting. The status accounting system tracks change activity and baseline releases, and it maintains a historical or archival record. A CSA system typically performs the following functions:

a. Tracks change activity and actions necessary to implement changes.

b. Provides a complete record of approved configuration documentation for each CI.

c. Records and reports the status of proposed engineering changes from initiation to final approval and implementation.

d. Records and reports the status of all critical and major requests for deviations and waivers which affect the configuration of a CI.

e. Records and reports implementation status of authorized changes to each affected CI or data item.

f. Provides the traceability of all changes from the original baseline configuration documentation of each CI/CSCI.

g. Reports the effectivity and installation status of configuration changes to all CIs at all locations.

h. Accumulates and formats data necessary to provide routine and special configuration accounting reports.

I.5.2.2 Configuration Status Accounting Data Elements. Configuration status accounting provides data on the status of systems, CIs, and changes. The most effective implementation is a relational database or product data manager where each object below can be related to other objects so that data does not have to be re-entered in multiple places. The following data is recommended to be included in the configuration status accounting system:

a. Change Package.
   1) Number/PCN
   2) Status (Open, Closed)

b. Change Request/Proposal or Deviation/Waiver.
   1) Number
   2) Revision identifier

3) Title
4) Date
5) Change Package Number
6) Data affected (proposed)
7) CIs affected (proposed)
8) Effectivity (proposed)
9) Authorizing CBD
10) CCB with disposition authority
11) Status (Open, Closed)

c. Data (Document, Drawing, etc.).
1) Number
2) Revision letter
3) Title
4) Effective Date
5) CCB with disposition authority
6) Authorizing CBD
7) Status (Draft, Approved, Released, etc.)

d. Control Board Directive.
1) Number
2) Revision
3) Date Dispositioned
4) Disposition (Approved, Disapproved, etc.)
5) Change Package Number
6) Data affected
7) CIs affected
8) Effectivity
9) Changes/Deviation/Waivers being dispositioned
10) CCB with disposition authority
11) Implementation Actions
12) Status (Open, Closed)

e. CBD Implementation Actions.
1) Number
2) Suspense Date
3) Actionee Name
4) CBD that authorized actions
5) CCB that authorized actions
6) Change Package Number
7) Data affected
8) CIs affected
9) Effectivity
10) Status (Open, Closed)

f. CI.
   1) Name or Number
   2) Top Assembly Part Number

g. Mod Kits.
   1) Change describing mod kit
   2) CBD authorizing mod kit
   3) CIs affected
   4) Effectivity (serial numbers, etc.)
   5) Location of each item to be modified
   6) Scheduled ship dates for mod kits
   7) Date each modification is installed

APPENDIX J1
GUIDANCE FOR CONFIGURATION VERIFICATION AND AUDITS

J1.1 Purpose. This appendix provides guidance for configuration verification and audit processes, which include the FCA/PCA and CM system audits.

J1.2 Applicability. This appendix applies to both MSFC in-house programs/projects and MSFC managed contracted projects.

J1.3 Related Requirements. Requirement 2.2.14.5 of MPR 7123.1 as it relates to FCA/PCA. There are no higher level requirements related to CM system audits.

J1.4 Related Functions/Roles. Related functions/roles may include Program/Project Manager, CM personnel, SMA, audit team members and the organization being audited.

J1.5 Configuration Verification and Audit Guidance. Configuration verification and audits utilize processes to verify that CIs have been properly identified, approved, released, and controlled throughout the program/project life cycle, and that the proper data has been maintained and reports generated to verify the configuration. The Program/Project Manager, Chief Engineer, SMA, and CM personnel are usually responsible for configuration verification and Audits. The following paragraphs provide typical processes for configuration verification and audits. This information is intended for guidance only and programs/projects are responsible for determining implementation.

J1.5.1 Configuration Verification. The program/project establishes a closed-loop system to verify that all actions associated with the approval of CI documentation have been tracked through closure.

J1.5.2 FCA/PCA. The FCA verifies that a CI's requirements have been met, and the PCA verifies that the CI's design to meet the requirements has been accurately reflected in the final product (i.e., "as built" matches "as designed" configuration). The program/project manager directs that an FCA/PCA or an equivalent review be performed prior to the delivery of a CI. The successful completion of the PCA establishes the Product Baseline. The FCA/PCA may be accomplished as a separate audit or as a part of other acceptance reviews so long as the FCA/PCA objectives are met. MPR 7123.1 establishes the Systems Acceptance Review (SAR) as a required review. The FCA/PCA may be accomplished as an integral part of the SAR. The SAR determines that the system has achieved sufficient technical maturity to warrant shipment to an operational facility or launch site. Establishing the Product Baseline assures that documentation, test results, and build records meet these criteria. Subsequent updates to the Product Baseline require specific controls over all baselined documentation, including detailed design drawings or in the case of software, actual coding. The FCA is normally performed late in the fabrication, assembly, integration, and test phase of the life cycle. The PCA is performed after manufacturing and build of the first article. Project FCA/PCA plans address FCA/PCA objectives by all NASA and Supplier organizations involved in delivering CIs which affect the top-level CI(s).

J1.5.2.1 Certification. Minimum certification should consist of the following:

a. An FCA Certification that verification test/analysis has been reviewed to assure compliance.

b. A PCA Certification that the actual build is in compliance with specifications and drawings (as-built agrees with as-designed).

J1.5.2.2 FCA/PCA Planning.

a. CM collaborates with Systems Engineering to develop an FCA/PCA plan detailing the review, certification required, and participation of both the Supplier and Government offices.

b. An FCA/PCA Plan is developed by the MSFC project for an in-house FCA/PCA.

c. For an FCA/PCA on a contracted CI, the plan may be developed by the MSFC project or the contractor.

d. Issues found during the FCA/PCA are documented and action items assigned (as needed) to address the issues and open work.

e. Certificates of Completion verifies successful conduct of the FCA/PCA and signatures of designated authorities on the certificate commit both the program/project and the supplier. Table II identifies certificates that may be applicable to the FCA/PCA. Figure 3 provides an example Certificate of Completion.

f. Appendix J2 provides detailed guidance for FCA/PCA planning and conduct of the audit, including an example audit plan outline and an example format for Issues-Actions in Figure 2.

g. FCA/PCA documentation to be available for the audit is described in Standard (STD) Data Requirements Description (DRD) for Functional Configuration/Physical Configuration Audit (STD/CM-AD).

J1.5.3 CM System Audits. The purpose of CM system audits is to maintain surveillance over the CM processes to ensure that they are adequately documented, that the process documentation is being followed, and that the process execution is in compliance with requirements.

J1.5.3.1 CM System Audit Planning. CM audits are performed to reduce risk during development, production, and operations. Contractor products and internal MSFC products are subject to CM audits. The products to be audited and the number and frequency of audits is dependent on the product's criticality to program/project success and the length of the product lifecycle. Insufficient audits may increase the risk of not meeting technical requirements and may be the cause for inaccurate build of both hardware and software products. Appendix J3 provides guidance on CM system audit planning for self-audits and/or more formal audits.

J1.5.3.2 Conducting CM System Audits. The following provides high level guidance a program/project may follow for conducting CM System Audits. Detailed guidelines are provided in Appendix J3.

a. Each MPR 7120.1 Mission Types 1 and 2 Program/Projects should conduct a minimum of one CM system audit prior to CDR.

b. MPR 7120.1 Mission Types 1 and 2 Program/Projects assess the need for additional CM system audits both at MSFC and contractor locations.

c. Other project categories assess the need for CM system audits for their products.

d. CM system audit planning should be addressed in the Program/Project CMP.

e. CM system audits assess the adequacy of the CM system in meeting MSFC requirements (in-house or contract) for configuration identification, control, accounting, and verification and audit.

f. Notification and planning for the CM Audit is provided to the audited organization prior to the audit.

g. Discrepancies found during the audit are documented as Findings-Observations, or equivalent, and corrective action assigned for each Finding.

h. An Audit Report is produced after the audit that summarizes the conduct of the audit and the results.

APPENDIX J2
GUIDANCE FOR FCA/PCA

J2.1 Purpose. This appendix provides detailed guidance for conducting an FCA and PCA.

J2.2 Applicability. This appendix applies to both MSFC in-house programs/projects/activities and MSFC managed contractor projects.

J2.3 Related Requirements. Requirement 2.2.14.5 of MPR 7123.1.

J2.4 Related Functions/Roles. Related functions/roles include Program/Project Manager, CM personnel, SMA, audit team members and the CI design organization being audited.

J2.5 FCA/PCA Guidance. The following paragraphs provide typical processes for planning and conducting the FCA/PCA. This information is intended for guidance only and programs/projects are responsible for determining implementation.

J2.5.1 FCA/PCA Plan. Project FCA/PCA plans address overall planning for completion of the FCA/PCA objectives by all NASA and contractor organizations involved in delivering CIs which affect the top level CI(s). The FCA/PCA for each individual CI is performed by the CI design activity with the FCA/PCA plan for that CI developed by the design activity. The NASA representatives participate in the design activity's audit by auditing the results of the design activity's completed FCA/PCA, such as the completed as-designed/as-built comparison.

J2.5.2 FCA/PCA Plan Example Outline. The following is an example outline that programs/projects may use as a guide for developing a FCA/PCA Plan.

1. Purpose
[*This section describes the overall planning for the conduct of the FCA/PCA*]

2. Objectives
[*This section describes objectives of the FCA/PCA.*]

3. Schedule
[*This section identifies the relevant milestones for this FCA/PCA. See example below.*]

TBD	FCA/PCA Plan Available
TBD	Data Package Available
TBD	FCA/PCA Kickoff
TBD	Conduct FCA/PCA
TBD	Action/Actionee Resolutions
TBD	Review Group (if required)

4. Hardware/Software
[*This section identifies the hardware/software elements to be audited for this FCA/PCA.*]

5. Review Process

[*This section describes the process to be used for the FCA/PCA.*]

5.1 Review Data Package

[*This section describes the review data package and reference documents for the FCA/PCA.*]

5.2 Team Organization

[*This section describes team organization and membership. See examples below. Tailoring of the specific team responsibilities for each project may be required.*]

5.2.1 The Responsible Design Organization reviews hardware design and performance as dictated by requirements specified in the End Item Specification and its flow-down requirements. Other areas of emphasis include deviations and waivers, nonstandard parts, and drawings.

5.2.2 CM provides, for each CI being audited, a list of the latest authorized configuration data (specifications, software version descriptions, drawings, parts lists, etc.), a list of authorized CRs, ECPs, and Deviation/Waivers, and the as-designed configuration indentured parts list from the release system. For audits of the contractor, CM would review changes and configuration accounting reports provided by CM.

5.2.3 SMA generates the as-built configuration data file, and reviews documentation from the inspection records and manufacturing (build paper) for completeness of inspection records, tags, and acceptance data package. In-house projects identify the required support and records required from the manufacturer's quality assurance personnel.

5.2.4 CM or SMA (per project task agreement) performs the as-designed/as-built physical comparison.

5.3 FCA/PCA Review Group

The FCA/PCA Review Group addresses all open issues/open work and assigns action(s) as necessary.

TABLE II: CERTIFICATES (TYPICAL) FOR COMPLETION OF FCA/PCA

Certificate	Purpose	Statement of Certification	Lead (as normally designated by program/project):
FCA Certificates			
• Performance	General review of all certifications to assure FCA complies with review criteria as defined in plan.	*The (subject) FCA audit is complete contingent upon closure of (open action/open work) and meets (cite plan criteria).*	FCA Review lead is designated by Program/ Project Manager.

Certificate	Purpose	Statement of Certification	Lead (as normally designated by program/project):
			Supplier's signature required.
• Qualification Test	Qualification testing assures product performance, quality, and reliability. Qualification testing may be accomplished by first article testing; verification testing of requirements; or any combination of methods that assure the product meets the design requirements.	*The (subject) FCA audit is complete contingent upon closure of (open action/open work) and meets (cite plan criteria). Testing has been satisfactorily completed and upon closure of (open action/open work) meets (cite plan) criteria.*	SMA team lead responsible for signature. Supplier's signature required.
• Deviations/ Waivers	Provides list and disposition status of *deviations/waivers* requested and resulting dispositions.	*The following list of deviations/waivers represents all requests for* exceptions to baseline *requirements. The list identifies current disposition status. The (subject) FCA audit is complete contingent upon closure of (open action/open work).*	SMA team lead responsible for signature. Supplier's signature required.
• Allocated Baseline	Provides list of all documents and data comprising the *allocated baseline* with meta data describing revision, release date, and authority certification.	*The following documents and data represent a complete and adequate identification of the allocated baseline and meets criteria of (subject) audit plan. (Or, as applicable.) The following actions are required to complete the baseline.*	CM team lead responsible for signature. Supplier's signature required.
PCA Certificates			
• Fabrication/ Inspections records (not	Performed following completion of manufacturing and	*Fabrication and Inspection records have been reviewed as part of*	SMA team lead

Certificate	Purpose	Statement of Certification	Lead (as normally designated by program/project):
required for CSCIs)	assembly operations. Intent is to review all as-built information and records. The information and format are requested by the Project/Program Manager with sufficient lead time. The request normally requires as-built and as-designed comparisons in specific formats. SMA obtains suitable reports from the As-Built Configuration Status System (ABCSS). See OI QD-QA-027.	*the PCA audit. Specifically, a comparison was made between as-designed and as-built configuration. All issues regarding nonconformances, baseline deviations, safety, and reliability issues were resolved except as noted in the attached list of actions. (As applicable) Further testing may be conducted so long as there is no change in configuration.*	responsible for signature. Supplier's signature required.
• Technical Documentation Control System	Verification that all documents submitted for the Product Baseline are current and have been reviewed for adequacy and accuracy and comply with contractual and agreed-to standards.	*The Technical Document Control System has been verified and the process and documents listed in Attachment 1 meet contractual/agreement criteria for requirements and adequacy and accuracy of content. Technical documentation on list 1 is released as the Product Baseline. Attachment 2 is a list of actions required for documents that do not meet Product Baseline criteria.*	Project Manager and CM team leads sign. Supplier's signature required.
• Documentation/ Drawing Review	Verification that all drawings submitted for the Product Baseline are current and comply with contractual/agreed-to standards and specifications.	*The documentation/ drawing review system has been verified and the process and documents listed in Attachment 1 meet contractual/ agreement criteria for*	Project Manager and CM team leads sign. Supplier's signature required.

Certificate	Purpose	Statement of Certification	Lead (as normally designated by program/project):
		requirements and adequacy and accuracy of content. Attachment 2 is a list of actions required for documents that do not meet these criteria.	
• Review of Shortages and Unincorporated Design Changes	An inventory prior to acceptance or shipment that all parts and documentation required for a complete shipment are available.	*The following shortages and unincorporated design changes are noted along with schedule of corrective actions.*	Project Manager and SMA team leads sign. Supplier's signature required.

Action Item (FCA/PCA)

CI/CSCI Number: **Nomenclature:** **Development/Process Center:** _____		**Date**: **Page** _ **of** ___
Developer/Subcontractor:	**Audit/Review Location:**	**Tracking Number:**
Title/Summary: **Discrepancy:**		
Recommended Solution/Action		
Category ☐ **Low** ☐ **Medium** ☐ **High**		**Audit Type** ☐ **FCA** ☐ **PCA**
Subsystem(s)		**Initiator** (Name, Phone #)**:**
Audited organization Chairperson:		**Action Assigned To** (Name, Phone #)**:**
Closure Submittal **Date** ____/____/____		**MSFC Chairperson:**
Closure (Attach closure information)**:**		
Closure Approval: _____ _____ **Chairperson** **Signature**		**Action Item Closure Date:** ___/___/

FIGURE 2 ACTION ITEM (FCA/PCA)

[Project Name]

FCA/PCA

Certificate of Completion

The subject FCA/PCA is complete and meets (cite plan criteria), contingent upon closure of the open actions/open work identified in the attachment. [Enter the appropriate Statement of Certification from Table J2.5.1]

_____ _____

[Chairperson] Date

_____ _____

[Review Group Member] Date

_____ _____

[Review Group Member] Date

_____ _____

[Review Group Member] Date

_____ _____

[Supplier Representative] Date

[Reference the list of open actions/open work if necessary.]

FIGURE 3 CERTIFICATE OF COMPLETION

APPENDIX J3
GUIDANCE FOR CM SYSTEM AUDITS

J3.1 Purpose. This appendix provides detailed guidance for performing a CM System Audit.

J3.2 Applicability. This appendix applies to both MSFC in-house programs/projects/activities and MSFC managed contractor projects.

J3.3 Related Requirements. There are no higher level requirements related to CM system audits.

J3.4 Related Functions/Roles. Related functions/roles include Program/Project Manager, project CM personnel, audit team, and audited organization.

J3.5 CM Audit Guidance. The purpose of the CM system audit is to ensure that the audited organization is compliant with the CM requirements of the project. That is, the configuration baseline is correctly defined, controlled, accounted for and verified, and any required corrective actions resulting from the audit are implemented. The following paragraphs provide typical processes for planning and conducting a CM system audit. This information is intended for guidance only and programs/projects are responsible for determining implementation.

J3.5.1 CM Audit Notification. The Project Manager provides formal notification to the audited organization that an audit is to be conducted. As a minimum, this notification identifies the location, date and time of the audit, the project audit team membership, and the requirements of the audit or the notification may reference the audit plan for these items. The notification also transmits the plan to be used for the audit. The notification letter identifies the type of audit (one-part or two-part) to be conducted.

a. The following is an example notification for the one-part audit:

"The MSFC CM Audit Team plans to perform an in-depth evaluation within the scheduled timeframe of the CM program and related activities. The audit is to be conducted in accordance with the following paragraphs."

b. The following is an example for the two-part audit:

"This audit is a two-part audit. Phase I consists of a self-assessment performed by (identify the contractor/MSFC in-house organization) personnel who are involved in and knowledgeable of the CM requirements, procedures and processes, procurement, engineering, manufacturing planning, manufacturing, and quality control operations. (Identify the contractor/MSFC in-house organization) reviews and evaluates their compliance with contractual/project-imposed CM requirements (or specific identified requirements) and their internal CM requirements and procedures. This assessment activity is conducted jointly with all members of the team to ensure that each of the respective disciplines and functional entities interface with those who are generating the requirements and those who are implementing the requirements. The purpose of

this activity is to ensure compliance with the external and internal imposed requirements and to identify any problems associated with the implementation of the requirements. (Identify the contractor/MSFC in-house organization) documents their Findings/Observations and recommended corrective actions.

Phase II consists of an assessment by the auditor of the Phase I Findings and recommendations and any in-depth review determined necessary by the auditor."

J3.5.2 CM Audit Plan. A CM Audit Plan is prepared and approved by the project that defines the requirements and guidelines to be applied during the audit. The plan defines the type (one-part or two-part) of audit required.

J3.5.3 CM Audit Plan Content. The following paragraphs describe the suggested content for the CM Audit Plan. The CM Audit Plan describes the roles and responsibilities of the auditor and audited organization, and describes how the audit is to be conducted.

J3.5.3.1 Purpose. Describe the purpose of the CM Audit Plan. "This plan defines the requirements and guidelines to be followed in the (project name) CM audit."

J3.5.3.2 Audit Objectives and Scope. Describe the CM Audit objectives. "The objective of this audit is to verify the adequacy of the (project name) CM system and to ensure compliance with (identify contractual or in-house document). Required corrective action for inadequacies and noncompliances identified during the audit will be defined."

J3.5.3.3 Audit Baseline. Identify the documents that define the baseline to be used for the audit. The baseline consists of the CM requirements that the audited organization is audited against. If a requirement in the audit baseline is not being met, this is a basis for a Finding to be written. For an MSFC in-house audit, the audit baseline would typically consist of the Project CM Plan, the MSFC Directives and/or Project-unique CM requirements, and procedural documents associated with these documents, plus contract CM requirements for any contracts managed by the MSFC in-house organization. For a contractor audit, the audit baseline would typically include the contract, any documents containing CM requirements made applicable by the contract, and the contractor CM Plan and associated procedures.

J3.5.3.4 MSFC Audit Team Membership. Identify the chairperson and team members. The MSFC Configuration and Data Management Office, in conjunction with the project manager, appoints the team chairperson and membership.

J3.5.3.5 Audit Location and Schedule. Identify the location and schedule for the audit.

J3.5.3.6 Administrative Support. Identify the administrative support to be provided by the audited organization. Normally, this support includes meeting facilities, clerical support, telephones, computers and associated equipment, office space and furnishings, reproduction equipment, and copies of the CM audit baseline documentation for the audit team members. The CM audit baseline documentation is provided to the audit team chairperson a sufficient time

period prior to the start of the audit in order that the auditor has adequate time to review and become familiar with the appropriate data and information. Also, the plan specifies additional information and associated documents that the audit team requires to be available during the audit. Lead times for the provisioning/installation of telephones, computers, and copiers are accounted for in the audit schedule. Lead times are normally defined in each respective contract; if not, they are specified in the audit plan.

J3.5.3.7 CM Support. Identify the required support to be provided by the audited organization. It is recommended that support includes at least one senior CM individual assigned solely and full-time for the duration of the audit. Additionally, other applicable individuals will be needed to meet with the audit team members for the purpose of answering questions, providing information and data, explaining procedures and operations, etc.

a. Further, the audited organization identifies and provides a senior representative who has the authority to obligate the organization and accept, reject, or negotiate the team's Findings/Observations. This responsibility includes documentation/submission of any proposals for closure and documentation submittal of root cause.

J3.5.3.8 Audit Process.

a. Preaudit Activities. Describe the Preaudit activities to be performed. These activities are applicable to both one-part and two-part audits. Preaudit activities typically consist of the following:

(1) Team Preparation. Each audit team member is required to be familiar with the audit baseline and the applicable requirements, procedures, instructions, etc., in order to efficiently and effectively accomplish the audit. Each member is preassigned specific area(s) of responsibilities by the team chairperson.

(2) Preaudit Conference. A preaudit conference is held between the auditor and audited organization in order to review the following:

(a) Address the purpose and objectives of the audit.

(b) Address the logistical aspects of the audit.

(c) Identify required documentation in advance by the team members.

(d) Discuss areas to be audited and the manner in which the audit is to be conducted.

(e) Determine the status of administrative functions, which have been prearranged in order to achieve an effective and efficient audit.

b. Audit Activities. Describe the audit activities that are required to conduct the audit. The typical activities for a CM audit are described in the following paragraphs. These activities are applicable to both one-part and two-part audits.

(1) Entrance Briefing. An entrance briefing serves as the initiation of the audit. The chairperson outlines the audit activities, schedules, responsibilities, and the method of documenting Findings/Observations. The audited organization addresses their organization and operations, specific subjects of interest that have been requested via the preaudit conference, and any other subjects which the organization believes are beneficial to the audit team.

(2) Audit Focus. The audit normally is focused on the following areas of CM:

(a) Organization.

(b) Configuration Identification.

(c) Change Control.

(d) Change Status and Accounting.

(e) Subcontractor/Vendor CM.

(f) Drawing Release System.

(g) Documentation Release System.

(h) Configuration Verification.

NOTE: The focus areas may be limited to specific areas as deemed appropriate. In the event different areas of focus are to be addressed in a two-part audit, include descriptions of the focus areas for each part of the audit.

(3) Team Reviews. The audit is conducted in accordance with the plan as defined in the audit notification letter. Phase I is conducted in accordance with the plan prepared by the audited organization. An audit checklist is provided in Table III. The checklist may be used as determined appropriate. The audit procedure may include group presentations, one-on-one interviews, review of procedures and processes, analysis of the audited organization's change proposal and change implementation documentation, engineering, manufacturing planning, and observation of systems operation.

(4) Team Findings/Observations. All noted concerns are identified and documented using the Audit Finding/Observation Record (reference Figure 4 that provides the format to be followed; sizing of the various areas for the headings is optional). The Findings/Observations contain the following:

(a) An accurate description of the Finding/Observation in sufficient detail to provide conclusive definition and evidence of the existing situation; and

(b) An indication of the level of concern using the "Finding" and "Observation" categories as defined below.

(5) Finding. The program/system deficiencies or irregularities noted in the areas, which are controlled by the MSFC project. Recommendations in these areas are intended to realign the system to conform to contractual requirements and/or internal requirements and procedures to prevent recurrence of the Finding.

(6) Observation. The program/system deficiencies or irregularities noted in areas not directly controlled by the MSFC project that need improvement for maximum effectiveness. Recommendations in these areas are intended to provide the program/system element with a more effective system.

NOTE: Any Findings/Observations that pertain to flight safety or are mandatory which are to be corrected prior to the next application of the respective task/operation are so noted on the Audit Finding/Observation Record.

(7) Daily Briefing. A daily briefing is held between the auditor and audited organization to present Findings/Observations identified. This activity may also address recommended corrective actions and target dates for closures. A copy of the Findings/Observations is provided to the audited organization. The audited senior representative is given the opportunity to accept/reject/modify the Findings/Observations and provide alternate proposals for corrective actions and closure rationale.

(8) Two-part Audit Review. When a two-part audit is conducted, the Findings/Observations from Phase I are presented to the MSFC audit team who is responsible for determining the validity and acceptability of the Finding and recommended corrective action.

(9) Exit Briefing. An exit briefing is held with the audited organization to present the results of the audit and, as a minimum, present and discuss the Findings/Observations and any unresolved issues. A copy of each Finding/Observation is presented to the audited organization. Any unresolved issues are subsequently presented to the Project Manager for resolution.

(10) Audited Organization Closure Rationale. On the audit Finding/Observation record, the audited senior representative indicates the closure rationale, including the root cause, and provides a completion date.

c. Post-Audit Activities.

The following activities occur following the completion of the audit:

(1) Audit Report. The chairperson prepares a written report addressing the team's activities and Findings/Observations. The report may, in addition to the Findings/Observations, recommend requirements or procedural changes to the audited organization's CM system. This report is provided to the Project Manager by memorandum within 30 calendar days following the conclusion of the audit. If desired by the project manager, a team briefing is provided. A sample CM audit report is provided in Figure 5.

(2) Audit Closure. The project tracks each Finding/Observation through closure. The closure paper is routed to the Finding/Observation initiator and then to the chairperson for concurrence before submitting to the Project Manager for approval. If either the Finding/Observation initiator, chairperson, or Project Manager nonconcurs with the proposed closure, rationale for the nonconcurrence is to be documented and attached to the closure form. If there were any Findings/Observations that the audited organization would not accept and the Project Manager accepted, the project office provides formal notification to the audited organization that the Findings/Observations are approved and corrective action is required.

(3) Audited Organization. The audited organization implements the corrective actions as authorized by the project manager. The audited organization provides monthly status reports of Findings/Observations until all open Findings/Observations have been closed. This report includes pertinent data regarding the Findings/Observations; e.g., tracking number, subject, resolution submittal date, project receipt date, closure notification and date, and any pertinent remarks. If it is determined that a Finding or Observation cannot be closed by its scheduled due date, the audited organization notifies the chairperson explaining why the action cannot be completed by the scheduled due date and propose an alternate closure date. A mutually agreed-upon revised scheduled due date is established.

(4) Revisions to Closure Action. If a revision to a closed Finding/Observation is required after all signatures have been obtained, the Project initiates a new audit Finding/Observation record and identifies it with a revision notation.

TABLE III: CONFIGURATION MANAGEMENT (CM) AUDIT CHECKLIST

	AUDIT SUBJECT	Answer (also list implementing plans or procedures, if applicable)	Procedure in Compliance Y/N
	GENERAL		
1	Is there adequate staffing of the CM Office (CMO)?		
2	Are CMO personnel areas of responsibility clearly defined?		
3	Are all applicable areas of CM staffed?		
4	Are personnel knowledgeable in their area of responsibility?		
5	What is the organizational relationship of the CMO to the project manager?		
6	Does the CMO have a direct line of communication with the project manager?		

	AUDIT SUBJECT	Answer (also list implementing plans or procedures, if applicable)	Procedure in Compliance Y/N
7	Are the organizational relationships of the CMO and the other organizations documented?		
8	Is software CM handled by separate CM procedures?		
9	Is there a CM plan approved by MSFC?		
10	Are there any authorized deviations to contractual/in-house CM requirements?		
11	Are changes made to the approved CM plan in accordance with established project requirements?		
	CONFIGURATION IDENTIFICATION		
1	Is an equipment-planning chart (drawing tree) available down to the lowest repairable or spare part?		
2	Is there a specification tree?		
3	Is documentation (specifications, drawings, etc.) used to document requirements in accordance with project requirements?		
4	Are practices used for the preparation and maintenance of baseline documents in accordance with project requirements?		
5	Are responsibilities of each functional organization for identifying baseline documentation consistent and logical?		
6	Is the method(s) used for assigning and controlling identification numbers (CEI drawings, serial, and lot) in accordance with project requirements?		
7	Does the system have vertical traceability of requirements?		
8	Are the practices for scheduling, tracking, releasing, and maintaining identification of documentation to be baselined in accordance with project requirements?		
9	Are modification kits identified in accordance with project requirements?		
10	Is the process used to identify, schedule, and track baseline documentation to be prepared and released in accordance with project requirements?		
11	What process is used to establish interface requirements?		
12	Are interface requirements referenced on released drawings?		
13	Are interface requirements established and contained in the requirement specification?		
14	Are subcontractors and vendors required to implement configuration identification?		
	CONFIGURATION CONTROL		

	AUDIT SUBJECT	Answer (also list implementing plans or procedures, if applicable)	Procedure in Compliance Y/N
1	Is there a system for establishing configuration baselines, processing engineering changes, and making deviations and waivers to established baselines?		
2	Does a change integration and tracking system exist?		
3	Does the change integration and tracking system provide appropriate data to ensure total implementation of approved changes?		
4	Are Class I and Class II criteria defined?		
5	Has a CCB been chartered?		
6	Have the CCB membership and associated responsibilities been defined?		
7	Are the duties and functions of the CCB defined?		
8	Are changes being properly classified as Class I/Class II?		
9	Are change proposals adequate, descriptive, and timely, and do they include/identify all affected documents?		
10	Is there an adequate process for scheduling and presenting changes to the CCB?		
11	Who is responsible for scheduling and presenting changes to the CCB?		
12	Are engineering change proposals evaluated by appropriate organizations, including contractors if affected, to determine impact against engineering, production, reliability, planning, schedules, cost, logistics support, safety, and training efforts?		
13	Are the mechanism, documentation, and process used for proposing emergency changes at the launch site adequate?		
14	Is there a system to control interface requirements?		
15	Is the method used to document CCB decision and assign implementation instructions adequate?		
16	Does the time period between decision being made and issuance of instructions by the CCB support the project's needs?		
17	After field “make work” changes are authorized, are affected drawings updated and subsequent effectivities corrected by normal change paper?		
18	Are the approved configuration baselines clearly identified to all applicable organizations?		
19	Are software changes processed via the CM system?		
20	Do the CM master change files identify a change, its status, associated impacts, affected documentation (or identification thereof), contract status, and implementation status?		

	AUDIT SUBJECT	Answer (also list implementing plans or procedures, if applicable)	Procedure in Compliance Y/N
21	Do the master files include both Class I and Class II changes?		
22	Is there a system for processing and controlling critical processes and components?		
23	Are MRB actions processed in accordance with project requirements?		
24	Is there a system for controlling/changing part numbers?		
25	Is identification of the change approval authority on the engineering change documentation or in release records?		
26	Are the practices concerning modification kits and instructions for incorporation of changes to delivered end items in accordance with project requirements?		
27	Is there a mechanism to prevent unauthorized changes?		
28	Is there a system for processing and controlling nontechnical changes?		
29	Do subcontractors or vendors initiate a system for processing and controlling changes?		
30	Are the subcontractors and vendors required to implement configuration control?		
31	Are MSFC-directed changes properly impacted and implemented?		
32	Does the CMO maintain a library of all documentation controlled by the MSFC project office and the design activity?		
	CONFIGURATION ACCOUNTING		
1	Do configuration identification indexes and modification status reports exist?		
2	Does the accounting system include all mandatory data?		
3	Is the frequency for updating the accounting system in accordance with project requirements?		
4	Is the configuration accounting system automated?		
5	Does management use the configuration accounting system?		
6	Is the CM accounting system being used properly?		
7	Are the configuration accounting records timely/accurate?		
8	Are proposed but not approved changes entered in the system?		
9	Are Class II changes entered into the system?		
10	Does the accounting system include deviations and waivers?		

	AUDIT SUBJECT	Answer (also list implementing plans or procedures, if applicable)	Procedure in Compliance Y/N
11	Is compatibility with project office configuration accounting system maintained?		
12	Is there a requirement to conduct periodic review and "redline" of the MSFC Configuration Identification Index and Status Report and the ICD Index and Status Report?		
13	Does the accounting identify serial or lot numbers?		
14	Are serial/lot numbers recorded on next assembly build paper?		
15	Are serial numbers/lot numbers shown on as-built configuration list?		
16	Are components or piece parts used that are not serialized or lot numbered? If so, what is the tracking procedure? Need to discuss intent.		
17	Are there any unique requirements for release of software and critical process documentation?		
18	Is "open"/transfer work tracked?		
19	How are modification kits tracked?		
20	How are modification kits closed out?		
21	Are modification kits tracked against major milestones?		
22	Does the as-built definition include deviations/waivers?		
	DOCUMENTATION RELEASE		
1	Are the practices for drawing/document release in accordance with project requirements?		
2	Does the process identify documentation required to be controlled by the release desk?		
3	Is there evidence that the required signatures/ approvals are affected prior to release?		
4	Are engineering orders to drawings incorporated in accordance with project requirements?		
5	Are Class I and Class II engineering change packages completely released prior to formal acceptance of the end item unit where first installed?		
6	Is production change effectivity called out in release records?		
7	Do manufacturing and quality verify they have the correct released documentation for the particular end item being produced?		
	CONFIGURATION VERIFICATION		
1	Are deltas between the as-designed and the as-built configuration identified?		
2	Does the change verification system provide a clear audit trail from change authorization to incorporation for all items of the change package?		

	AUDIT SUBJECT	Answer (also list implementing plans or procedures, if applicable)	Procedure in Compliance Y/N
3	How are CM reviews and inspections conducted?		
4	Are RIDs tracked and closed?		
5	Do CM personnel have a role in design reviews and configuration inspections?		
6	Does the verification process include subcontractor/vendor engineering changes?		

Project:	**CONFIGURATION MANAGEMENT (CM) AUDIT FINDING/OBSERVATION RECORD**	**Date:**	**Page _of ___**
Number:		☐ **One-Part** ☐ **Two-Part – Phase I** ☐ **Two-Part – Phase II**	
☐ **Finding** ☐ **Observation**	**Evaluator (Auditor's) Name:**		

Finding/Observation Description and Root Cause (Evaluator - Describe the Discrepancy or Observation and state the Requirement being violated, if applicable):

Comments/Recommended Action/Due Date (Evaluator – Provide additional comments and/or describe a recommended action and due date):

Chairperson Concurrence	**Audited Senior Representative Concurrence**
Name: _____ **Date: _____**	**Name: _____** **Date: _____**

Corrective Action/Due Date (Audited Representative - Record planned corrective action and due date as agreed to by the audit chairperson and audited representative):

Action Concurrence

Chairperson: _____ **Date: _____**	**Audited Senior Representative: _____** **Date: _____**

Closure Rationale/Completion Date (Actionee – enter corrective action closure description and attach closure evidence, if applicable):

Closure Approval

Chairperson: _____ **Date: _____**	**Audited organization Management:** **_____** **Date: _____**

FIGURE 4 CM AUDIT FINDING/OBSERVATION RECORD

J3.5.3.9 Finding/Observation Process.

NOTE: Findings/Observations may address areas of project planning and implementation related to requirements/design maturity, baseline maturity vs. project activities, CM-related milestones such as FCA/PCA and Sustaining Engineering, etc. For these types of Findings/Observations, it is recognized that CM is not in direct control of project planning, and that the project sometimes accepts risk to proceed with work and meet schedules. The intent of documenting these issues is to ensure that the Project is aware of the risk and has action plans in place to alleviate or address the risk. If action plans are in place, the corrective action for the Finding/Observation may be to state the Project actions in process.

1) Evaluator completes the following fields:

Project: Project name being audited.

Page __ of ___: Page number and total number of pages of the Finding/Observation.

Number: Finding/Observation number. Number format is Project Acronym-Evaluators 3 Initials-sequential number for that evaluator (e.g., ECLSS-ASH-01).

Finding/Observation Check Blocks: Indicate whether the record is a Finding or an Observation. This serves as a recommendation to the Audit Chairperson who makes the final decision on this value.

Evaluator Name: Name of person writing the Finding/Observation.

Date: Date that the Finding/Observation was documented.

Finding/Observation Description and Root Cause: Describe the discrepancy or observation; state how the discrepancy was found/evidence of the discrepancy, and state the requirement or procedure violated (e.g., "PCN files CD00003, CD00025, and CD00050 did not contain the information required by OI ED43-026. CD00003 was missing the ECR form, CD00025 index was incomplete, ..".). Provide as much detail as possible to promote understanding and justification for the Finding/Observation.

Comments/Recommended Action/Due Date: Provide any additional comments and a recommended action that would correct the Finding/Observation.

2) Evaluator provides the Finding/Observation to the Audit Chairperson for review.

3) Audit Chairperson reviews to ensure that the information is complete and understandable. The Chairperson may ask the evaluator to expand or alter the Finding/Observation to ensure complete information is captured. The Chairperson determines whether it is a Finding or

Observation. The Chairperson provides the Finding/Observation to the Audited Senior Representative for review.

4) The Audit Chairperson and Finding/Observation Initiator discuss the Finding/Observation with the Audited Senior Representative to ensure understanding and agreement, and may review the evidence of the Finding/Observation. This discussion may occur real-time during the Audit activities, or at end-of-day meeting between the Audit Team and Audited Organization's Team. If the Audited Senior Representative has additional information that changes the Finding/Observation, the Finding/Observation is altered to more correctly express the problem or aid understanding. Possible corrective actions may also be discussed at this time.

5) If the Audit Chairperson and Audited Senior Representative agree that the documented Finding/Observation is valid, they sign in the "Chairperson Concurrence" and "Audited Senior Representative Concurrence" blocks. If there is disagreement over the validity of the Finding/Observation, the designated Audit Advisor makes a determination. If there is still disagreement, the Project Manager or project-selected designee is asked to make the determination.

6) The Audited Senior Representative fills in the planned Corrective Action/Due Date block with a planned action and suspense date. If the specific action is not known at that time due to uncertainty or inability to change project requirements, processes, schedule, or resources, the action may state that the corrective action is to be investigated and finalized by a suspense date (e.g., "Possible corrective action is.... Consult with project and provide corrective action by ____ (suspense date).").

7) The Corrective Action/Due Date is reviewed by the Audit Chairperson and if agreed, the Action Concurrence block is signed by the Audit Chairperson and Audited Senior Representative.

8) After the Exit Briefing, the Audited Senior Representative completes the Closure Rationale block with action closure information and submits action closure to the Audit Chairperson.

CONFIGURATION MANAGEMENT AUDIT REPORT

CONTRACT NAS8-XXXXX

(*Date of Audit*)

Prepared by:

_____*(Signature)*_____ ____*(Date)*___

Audit Chairperson, _____(Project)_____ Office

FIGURE 5 SAMPLE CM AUDIT REPORT

CM AUDIT REPORT

1. SUMMARY

An audit of *(audited organization)* CM program was conducted by an MSFC team at the organization's facilities at *(location of audit)* during the period *(inclusive dates of audit).* The audit was conducted as delineated in the CM audit notification letter and attached plan. See attachment.

A total of *(number of Findings)* Findings and *(number of Observations)* Observations were identified during the audit. *(Insert a brief synopsis of any significant Findings/Observations, or any problems that may have occurred during the audit.)*

2. AUDIT ACTIVITIES

2.1 Purpose. The purpose of the audit was to review and evaluate the *(Project)* CM system and operations to ensure compliance with requirements, provide guidance for improved operation, and to identify inadequacies in procedures and operations.

2.2 *Audit Baseline. The audit baseline consisted of the following, as applicable:*

2.2.1 The applicable portion of contract/statement of work.

2.2.2 The applicable data requirements.

2.2.3 The baselined copy of the CM plan.

2.3 MSFC Audit Team Organization. The MSFC audit team was composed of the following:

Chairperson: _____
Member: _____
Member: _____
Member: _____
Member: _____

2.4 Audit Process.

2.4.1 The audit was conducted using the following audit techniques:

2.4.1.1 Comparison of MSFC requirements against *(audited organization)* policies, plans, procedures, etc.

2.4.1.2 Personnel interviews.

2.4.1.3 Group presentations/briefings.

2.4.1.4 Inspection/analysis of change documentation, reports, manufacturing work authorization documents, etc.

2.4.2 The major elements reviewed/addressed via the audit were as follows: *(Insert appropriate areas covered during audit.)*

2.5 Exit Briefing.

A formal exit briefing presentation was provided to (audited organization*)* management by the MSFC audit team. The Findings/Observations were reviewed and discussed.

3. FINDING/OBSERVATION, TRACKING, AND CLOSURE

Attachment 1 contains all Findings/Observations of the (*specify one-part or two-part audit*). Each Finding/Observation is tracked by the MSFC *(Project)* Office until formal closure. The MSFC audit team chairperson concurs or nonconcurs with the proposed closure, and the Project Manager takes the action to formally close the Finding/Observation.

APPENDIX K
REFERENCES

NPR 1441.1, "NASA Records Management Program Requirements"

NPR 7150.2, "NASA Software Engineering Requirements"

NRRS 1441.1, "NASA Records Retention Schedules"

MGM 7120.3, "MSFC Data Management Guidance"

MPR 1440.2, "MSFC Records Management Program"

MPR 2800.2, "MSFC Information Technology Services"

MPR 7120.1, "MSFC Engineering and Program/Project Management Requirements"

MPR 7123.1, "MSFC Systems Engineering Processes and Requirements"

MPR 8730.3, "Control of Nonconforming Product"

MWI 8730.3, "MSFC Material Review System"

MSFC-STD-555, "MSFC Engineering Documentation Standard"

MSFC-STD-3394, "Standard for Contractor Configuration Management for MSFC Programs/Projects"

ASME Y14.100, "Engineering Drawing Practices"

MIL-STD-961, "Department of Defense Standard Practice, Defense and Program-Unique Specifications Format and Content"

IEEE 12207, "Software Life-Cycle Processes"

QD-QA-027, "Summarizing As-Built-Configuration"

MSFC Form 516, "Change Evaluation"

MSFC Form 847, "Deviation/Waiver Approval Request (DAR)"

MSFC Form 2312, "Control Board Directive (CBD)"

MSFC Form 2327, "Engineering Change Request (ECR)"

MSFC Form 2348, “Engineering Change Proposal (ECP)”

MSFC Form 2490, “Installation Notice Card (INC)”

MSFC Form 4229, “Interface Revision Notice”

STD/CM-AD, “DRD for Functional Configuration/Physical Configuration Audit Documentation”

STD/CM-CMP, “DRD for Configuration Management Plan”

STD/SE-RQMTSPEC, “Requirements Document/Specification (REQSPEC)”

STD/SW-SCMP, “DRD for Software Configuration Management Plan”